MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE

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REVIEWS: UPI **Fw 190** · GLOBAL **PT-19** · MAGMA **3D-JAM**

October 1998

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MODEL AIRPLANE NEWS

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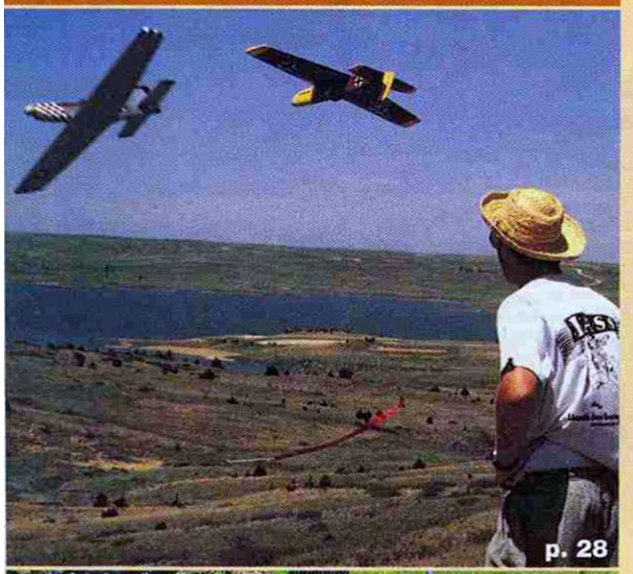
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On the cover: a Cornell—the winterized version of the PT-19—does a low pass at the World Miniature Warbirds Association meet.

On this page (top to bottom): a couple of DAW foamies mix it up on a Kansas slope; hidden from reconnaissance planes, this Fw 190 sits in the pits at the WMWA meet; we review the Global PT-19 ARF.

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EDITORIAL

by LARRY MARSHALL

THE INNOVATORS

These days, when people talk about progress, we all too often start discussing technological developments. When we talk about solutions to problems, technology discussions also seem to boil to the top. But when you think about it, technology doesn't cause progress; progress still comes from human passion and innovation.

The Byron Expo was successful in getting model aviation in front of large crowds.

This B-25 has just returned from its mission of bombing the oil field in the background.

It doesn't matter whether it's a pill for impotence, a faster computer, or a better way to shine your shoes; someone sat down and thought it was a good idea and made it happen. So it is in model aviation, too. New products, new ways to promote our hobby, new ways of having fun ... all these things come to pass because someone has an idea and acts on it.

Model aviation history is full of people who have done this. Maxwell Bassett and Bill Brown, whose Brown Junior made gas-powered models practical; these guys are good examples of innovation moving our hobby in new directions. Driven by a desire to outperform rubber-powered counterparts, they generated entirely new ways to enjoy model aviation with their new power option. Bob and Roland Boucher did the same with electric power systems many years later. When Jim Walker presented control-line airplanes to us, he did so with a flair. The promise brought by those red, white and blue boxes with the then famous "AJ" (American Junior) logo meant that inside were the makings of a model airplane that could actually be controlled; you could feel it fly. And what about "incandescent" engine power? Ray Arden's invention of the glow plug certainly has to rank right up there at the top of the list of innovations that have shaped our hobby.

The pioneers of R/C are numerous—DeSoto, the Good brothers, Lanzo and Kraft come to mind. These guys—and a whole bunch of others—moved R/C from an electronic art to a point where, today, we take for granted the radio gear we use.

In recent months, one of the modern-day innovators has left our ranks. Byron Originals announced they will no longer supply kits, engines and accessories, though they will continue to provide us with the fuel products they've produced for so many years. With the closing of this company's hobby division, we will no longer have Byron Godberson's passion pressing model aviation forward. He was one of the first to provide kits for giant scale airplanes, one of the first to use foam extensively in model airplane kits and produced a large, belt-driven power system so that warbirds could actually fly with large, 4-bladed props. He was also on the leading edge of practical ducted-fan technology with the Byrojet. Byron also saw the need to promote model aviation to non-modelers and created the Byron Expo, complete with WW II re-enactments. Yes, Byron was indeed an innovator. We owe him much, and he will be missed.

WORLD MINIATURE WARBIRDS ASSOCIATION

One of the unsung areas of innovation is ideas that bring modelers together to have fun. Some of the successful innovations of this genre have been SMALL (Small Miniature Aircraft Lover's League) and the IMAA (International Miniature Aircraft Association), each promoting having fun with aircraft of a particular size. An offshoot of the IMAA has been a growing popularity of warbird meets, at least on the East Coast. These meets are particularly fun because not only do guys get together and fly their warbirds, but there is much discussion of the warbirds themselves.

Dino DiGiorgio thought the idea was being "underutilized," as these meets, while fairly common in the Northeast, are not common elsewhere. Further, because they are IMAA meets, they excluded the flying of the vast majority of model warbirds that have been built from Dynaflite, Midwest, Top Flite, etc., kits and powered by .40- to 1.20-size engines.

And so the WMWA was born. Their goal is to be an organization for guys who like to fly warbirds of any size. Membership costs only a few bucks, and a couple of WMWA members, anywhere, can form a "wing" and hold their own warbird meet. The only "rule" is that at WMWA meets, any warbird that can ROG (rise off ground) can participate. No muss, no fuss ... just fun.

This month, we bring you coverage of the first WMWA meet, in Kirkwood, NY. I can tell you firsthand that it was a great event, but Gerry Yarrish will supply the details as he takes you to a new concept in event fun.

AirSCOOP

by CHRIS CHIANELLI

New products or people behind the scenes; my sources have been put on alert to get the scoop! In this column, you'll find new things that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you, the reader, who matters most! I spy for those who fly!

TWO Global ARFs Get Bigger

Global Hobby Distributors' .25-size Me 109 and Tequila Sunrise ARFs now have .40-size big brothers. Just like their diminutive counterparts, these larger ARFs are 90 percent ready to fly out of the box and feature lightweight wooden construction. They come covered just the way you see them pictured here. Specs for the Me 109: length—46 inches; wingspan—54.5 inches; wing area—590 square inches; flying weight—5 to 5.5 lb.; engine required—.40 to .53 2-stroke, .52 4-stroke. Specs for the Tequila Sunrise: length—47.25 inches; wingspan—52 inches; wing area—570 square inches; engine required—.45 to .53 2-stroke, .52 to .60 4-stroke.

For more information, contact Global Hobby Distributors, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 964-0827; fax (714) 962-6452.

Star Cruiser

A true trainer in 1/2A size

Tom Herr and his expert laser-cutting staff at Herr Engineering are at it again. Their latest, super precision-cut kit is the Star Cruiser, which is a 2- to 3-channel trainer that boasts a steerable nose gear, excellent ground handling and easy takeoffs and landings. A removable hatch gives excellent access to the fuel tank for simple installation and quick servicing. The Star can use standard servos, but smaller radio gear will allow significant weight savings that directly enhance the model's already outstanding flight performance. The kit features: all laser-cut parts; tab-and-notch construction for assembly accuracy; 3-D CAD design for precision part fit; computer-drawn plans; quality hardware pack; prebent landing-gear legs; peel-and-stick window decals; and a complete, step-by-step instruction manual. Specs: wingspan—42 inches; wing area—267 square inches; weight—17 ounces; wing loading—9.17 ounces per square foot; engine required—.049 to .061. For more information, contact Herr Engineering Corp., 1431 Chaffee Dr., Ste. 3, Titusville, FL 32780; (407) 264-2488; fax (407) 264-4230.

B-2 R/C

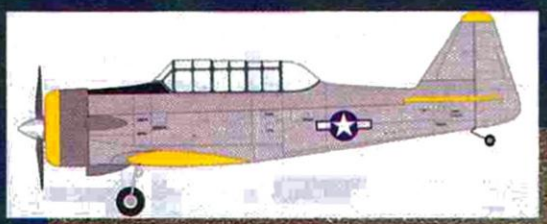
Kinetics has introduced this revolutionary R/C model of the awesome B-2 bomber. For true stealthy operation at a neighborhood field where silent missions are a must, the B-2 comes powered by two 400+ electric motors. For all-out surprise attacks, however, the B-2 can be set up with a pair of 0.049 engines. The B-2's wingspan is 48 inches, and it operates on a 2- or 3-channel radio. The body is a vacuum-formed panel of high-impact ABS plastic to which the decals are applied directly; no painting is required. Price, including all hardware and two electric motors, is $195.95. For more information, contact Kinetics, P.O. Box 1071, Mercer Island, WA 98040; (425) 641-5611.

MORE ON

EZ's Return!

My report in the June edition of "Air Scoop" concerning EZ's return to the shores of North America has evoked modeler delight, to say the least. I know I'm a happy boy!

Well, here are two more you can add to the extensive line of beautifully crafted EZ kits.

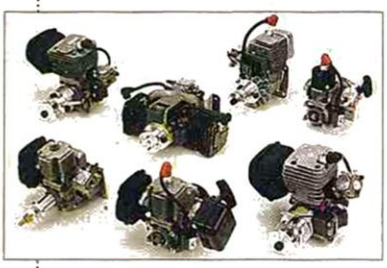


Modeled after the BEAT ON 140, which was designed by F3A world championship competitor Mr. Akiba, the slick BEAT ON pattern design is now available from EZ in .30 and .90 sizes. Both kits feature a carbon-fiber-reinforced cowl and tuned-pipe cover and removable stabilizer and come with the highly visible graphic design shown here. BEAT ON 30/50 specs: length—55.4 inches; wingspan—52.4 inches; wing area—530 square inches; weight—5.3 to 5.5 lb.; engine required—.30 2-stroke, .50 4-stroke. BEAT ON 90 specs: length—67.7 inches; wingspan—67.7 inches; wing area—840 square inches; weight—7.7 to 7.9 lb.; engine required—.90 4-stroke. Both sizes require a 5-channel radio and six servos.

Next up is the Texan 30, which comes with retracts and the scheme you see here. Specs: length—42 inches; wingspan—57.3 inches; wing area—572 square inches; weight—4.8 to 5.3 lb.; engine required—.30 to .40 2-stroke, .40 to .50 4-stroke; radio required—5-channel; servos required—5. For more information on the entire EZ line, contact Magma Intl. Ltd., 18 Crown Steel Dr., Unit 107, Markham, Ont., Canada L3R 9X8; (905) 305-9753; fax (905) 305-9755; email: sales@magmarc.com; website: www.magmarc.com.

Fast-lane Skylane

Get into the air fast with Hangar 9's new ARF Ultra Series Cessna 182 Skylane. Built from balsa and plywood and covered with Goldberg Ultracote, this general aviation favorite is 90 percent completed. From the drooping wingtips to the small rudder nacelle on the top of the vertical stabilizer, the Hangar 9 Skylane is a detailed rendition of a full-scale 182. There is no plastic on this ARF; parts such as the cowl and wheel pants are fiberglass and are pre-painted to match the trim scheme. According to Horizon Hobby, the distributor, it flies great, too. The 182 uses a semi-symmetrical airfoil that provides scale-like flight characteristics at lower power settings and mild aerobatics at higher settings. The large wing area (579 square inches) and light loading make landings as easy and forgiving as those of the full-scale Skylane. Specs: wingspan—66 inches; wing area—579 square inches; weight—6 to 6.5 lb.; engine required—.40 to .50 2-stroke, .50 to .65 4-stroke.



Here's more news from Horizon Hobby Distributors. The super-fine line of Zenoah gas ignition engines is now distributed by the company. That includes the little 1.4ci G23, the big 4.5ci Z-445 twin and everything in between. Even better, the line is now backed by the Horizon three-year warranty that's handled by its professionally staffed, friendly service center. For more info on the aforementioned products, contact Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

Zero —in almost as little time

The Mitsubishi Zero has always made a great modeling subject—good planform, long tail moment, lots of paint schemes and interesting history. Now you can have a bit of "Pacific nostalgia" in a very short time because this Zero is 90 percent factory-built and -covered. Patterned after the full-scale original, the kit features a "stressed-skin composite" covering that is finished in authentic military matte colors, and the plastic parts are hand-painted to match. The kit includes Great Planes hardware such as steel rod-in-tube pushrods, control horns, clevises and wheels. All control-linkage hardware is internally mounted to preserve scale appeal. While fixed gear is standard, wheel wells and mounting rails are installed to accept optional retracts. Specs: wingspan—59.75 inches; wing area—575 square inches; weight—6.5 to 7.25 lb.; wing loading—26 to 29 ounces per square foot; engine required—.40 to .51 2-stroke, .61 to .80 4-stroke. For more information, contact Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826; (217) 398-6300; fax (217) 398-0008.

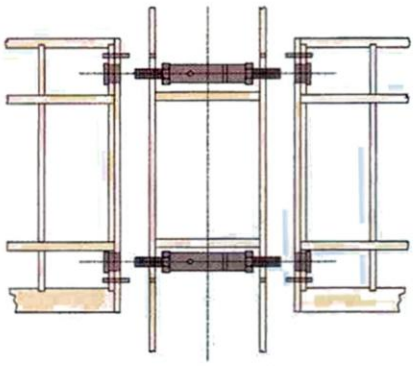
Our own show!

Produced by Ambassador Productions, R/C TV is a 30-minute program dedicated to all aspects of radio control. The show features planes and helicopters, and each episode includes a manufacturer's showcase, technical tips, builders' corner, R/C news and cool tools. The show introduces you to some of the experts in the field and provides you with plenty of action-packed footage. R/C TV is packed with information to pique people's interest in the R/C hobby. See detailed, hand-crafted aircraft and world-class piloting skills and meet the people behind the controls. We think this show will further bring R/C into the mainstream, and we applaud its arrival.

If you would like to see R/C TV in your area, contact your local Public Broadcasting station (PBS) and request R/C TV. For more information, visit Ambassador Productions' website at www.rctv1.com.

AIRWAVES

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News**, 100 East Ridge, Ridgefield, CT 06877-4606; email **man@airage.com**. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we can not respond to every one.



MORE ON DIFF SCREWS

In his article, "How to Mount Wings Using Differential Screws" (August 1998), Al Ehrenfels devised a fine technique for mounting wings on differential screws. But some key items are missing from the explanation, and no modeler can create such a setup unless the missing information is added.

There is no mention of how the aluminum rods are able to accept the screws. A casual reading of the article implies that these rods may have been purchased ready to use, but I find that hard to believe. It seems that what was omitted from the text was a statement that the rods must be drilled at each end and tapped for the two different threads. This is quite a task for any modeler who lacks a setup for accurately boring into a metal rod.

Also, when Ehrenfels states that "You might think this would result in my unscrewing the left wing at the same time ...", he has not explained that the screw is, in fact, being unscrewed from the left wing. (How could it be otherwise?) But the greater pitch of the opposite screw only succeeds in not losing the left wing because of slack between the screws within the fuselage sides. If this is not so, then we have moved into the area of mysterious forces at work.

This is a significant presentation, but it needs a follow-up explanation to be of real use to modelers.

DAVE SEGAL
Philadelphia, PA

I guess the attachment of the threaded rods to the aluminum center rod was not clear. All you need to do is drill out the aluminum rod to accept the threaded rods and pin them as shown on the diagram. No threading of the aluminum rod is necessary; the nuts on the end hold everything in place.

If you don't want to drill, buy three sizes of aluminum tubing that telescope into one another. Make sure that the smallest inside diameter will accommodate the threaded rods; then cut short lengths of each and glue them together. This will produce a thick-walled tube to use in Al's device.

You quoted Al's statement, "You might think this would result in my unscrewing the left wing at the same time ...", and you added " ... he has not explained that the screw is, in fact, being unscrewed from the left wing. (How could it be otherwise?)"

The arithmetic Al presents reflects this. As Al says elsewhere, the differential screw acts as a "turnbuckle." LM

THEY LIKE FREE FLIGHT COVERAGE

I'm not generally motivated to write letters to the editor, but the arrival of the August issue of *Model Airplane News* has given me the incentive to provide some long overdue feedback from a long-time reader. I have been in the hobby for about 48 years and have always found *Model Airplane News* at the top of my list of "must read" model-aviation reading material. It has a wonderful heritage that has covered all aspects of the model airplane hobby.

I think the August issue content is an exemplary statement about the balance of our hobby and the direction in which it is moving. Your coverage of the Flying Aces Club free flight event along with that of Top Gun does a great job of presenting the range of possibilities available to the model airplane enthusiast. This is really brought home with the page-36 picture of the Top Gun participants holding their free flight scale models. Free flight and control line models represent a great form of model aviation when building time is limited, flying sites are limited and budgets are limited. I really enjoy the R/C segment of the hobby, but it is nice to dabble in the other forms as well.

While the August issue did an excellent job of portraying the many facets of model aviation, I would also like to commend you on the content of the magazine over recent years. Including more electric content and mixing in some of the smaller models has done a great job of keeping the hobby fresh. There are so many avenues we can explore in our great hobby. *Model Airplane News* provides some great signposts to allow us to navigate the roads to success in our modeling endeavors.

PAUL BRADLEY
Fulshear, TX

Just a note to let you know that I thoroughly enjoyed the indoor free flight article in the August issue. Even though my main interest is R/C sport flying, I try to indulge in all aspects of model aviation. Therefore, I look forward to seeing additional articles on free flight and any other model airplane facets that you may see fit to publish in the future.

DUANE NELSON
Fair Oaks, CA

Thanks to all who wrote in response to our free flight coverage in the August issue. In our view, model aviation still offers more ways of having fun than any other hobby, and we're fortunate to be a small part of it. LM

POWER CHOICES

First, thanks for the tons of helpful information that your magazine has brought me; reading it is a daily ritual. I have a question or two about power. In your March issue, I read a great article by Greg Hahn on the right props and power for scale flight. All the information was pivotal in the engine selection for my model. The ratios he gave for 1 horsepower per 8 pounds was very useful.

Now the details of my dilemma. I have an Fw 190 with a 55-inch span; I modified the plane for flaps and retracts and a few detail goodies. The plans

indicated a weight of 3 to 5 pounds and called for a .25 to .50 engine. Mine comes in at a little over 6 pounds. I purchased an O.S. .32 Max SX for the plane, going with the cut sheet's information of 1.2b.hp/18,000rpm. Many guys at my field like extra power and recommend a .40 or larger. If the formula I found in your March issue is correct, the .32 should be fine for scale power. I have a Thunder Tiger Pro .46 in another plane, and the data sheet gives a power rating of 1.43b.hp/16,000rpm, but the recommended prop sizes are identical for both engines. This is my first scratch-built, and I would appreciate any help you may give me. Are my friends right? More power? Or do I have enough to make my Focke Wulf fly scale? [email]

BRIAN SWARTZ

Realize that Greg's perspective, and certainly the discussion in his article, relate primarily to large, scale airplanes. Because air doesn't scale, power requirements for smaller planes may be somewhat higher than for larger planes. Speeds (relative to mathematical scale speed) will also generally have to be higher.

A 6-pound airplane with a 55-inch wingspan begs for a .40 to .46 2-stroke or a .60 to .70 4-stroke. The truth is, you won't achieve "scale speed" with a model—any model. With planes this size, it becomes even more difficult. I might add that if you did achieve scale speed, you wouldn't like its look, as your Fw 190 would look as though it were going painfully slow. A 55-inch-wingspan Fw 190 is roughly 1/8 scale, and you'd find full-size Fw 190s, at low altitudes, flying less than 300mph—probably closer to 250mph. "Scale" speed would therefore be somewhere between 40 and 50mph, and most people fly their .40-size trainers that fast.

You mentioned the 1.2b.hp/18,000rpm statistic for the O.S. .32 and 1.43b.hp/16,000rpm for your Thunder Tiger .46. There is a difference between horsepower and thrust. Horsepower production increases with rpm in a curvilinear fashion. But the way you get higher rpm is by installing a smaller propeller. To get your O.S. .32 to spin at 18,000rpm, you'd have to use a very small propeller because as rpm increase, the torque (ability to spin a prop load at that rpm) decreases.

Typically, we don't prop our engines for top horsepower because we generate far less thrust because of the tiny prop. A typical prop for the O.S. .32 would be a 9x7 or 10x6. My guess is that this engine would spin those props at 12,000 to 13,000rpm, and you won't get 1.2hp from that engine. The flip side of the argument, though, is that some of the newer .32s produce as much power or more than some of the .40s on the market. Since you have the engine, I would give it a try in the plane. Given the big radial cowl of the FW, it shouldn't be a problem to install a larger engine if you decide you need more power. LM

Pilot PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING

SEND IN YOUR SNAPSHOTS

Model Airplane News is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of 1998. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, Model Airplane News,100 East Ridge, Ridgefield, CT 06877-4606.

CHARLIE BIRD

This unique design is the handiwork of Charles Richard of Lancaster, CA. Powered by a 75cc 2-stroke, the model features a conventional balsa frame and sheet-covered flying surfaces. Its fuselage, canopy, cowl and spinner are of molded fiberglass. Charles writes, "This is the second version of this staggered-wing biplane design. It is 30-percent scale of the full-size aerobatic sheet-metal design." The model's fuselage is accessed by removing the canopy, and the removable wings are mounted on aluminum tube spars.

1910 BLERIOT

Dieter Pfingstmann of Prüm, Germany, designed and built this 1/4-scale Bleriot and equipped it with functions such as wing warping that were found on full-size Bleriots. The 15-pound model has a 94-inch wingspan, uses an O.S. 1.20 4-stroke for power and is covered with Antique Super Coverite. Dieter writes, "This was my first scale project ... it's an excellent flier—just like a trainer."

BEECH C-45

Rick Michelana of McAllen, TX, built this glass and foam Beech C-45 from an American Eagle kit. The 82-inch model is powered by two Thunder Tiger .46s and weighs 13 pounds. It's finished with automotive lacquer with a urethane topcoat.

OSA'S ARK

Allen Mrock of Oxford, MI, built this S-38 model using Classic Aero plans and accessories and later sold the model to the Sikorsky Aircraft Co. The 1/6-scale S-38 has a 12-foot wingspan and weighs 48 pounds; the full-size S-38 is under construction and will soon be released to the public.

BOOMERANG

Joe Colletti Jr. of Chalmette, LA, scratch-built this model of a Burt Rutan plane using his own CAD-drawn plans. The 81-inch-span model weighs 11 pounds, uses two O.S. .52 Surpass 4-strokes and features operational retracts and gear doors. Joe covered the wing panels and tail surfaces with Ultracote and painted the rest of the model with Hobbypoxy. Boomerang is controlled with two receivers and two battery packs, with one set in the fuselage and one in the engine boom; each receiver is attached to five servos to control the surfaces and retracts of that structure.

SUPERMARINE SPITFIRE

Gary Allen of Rochester, NY, built this 20.5-pound Yellow Aircraft Mk. IV Spitfire. The model is finished in Perfect Paint and uses a SuperTigre 2500 fitted with an O.S. carburetor for power. Its retracts, wheels and spinner are from Yellow Aircraft.

SKYCAM ELECTRA

This 64-inch-span pusher prop model was designed and built by Clark Salisbury of North Logan, UT. It flies for 3½ minutes at full throttle on 12 cells and using a brushless DC motor. Designed to carry a 35mm camera to take aerial photos, the 6½-pound model can also use a .46 2-stroke for power.

1/6-SCALE LYSANDER

Dan Crase of Garden City, KS, sent this photo of a Westland Lysander he built from Bob Holman plans. The 100-inch-span model is powered by a .90 SuperTigre engine and has a fiberglass cowl and spats. Weighing in at 12 pounds, this Lysander is covered with Super Coverite Black Baron and is painted with LustreKote.

ALL GROWN UP

Herman Welch of Orlando, FL, took plans for a 24-inch-span rubber band model and enlarged them to 6 feet to build this Great Lakes. The model weighs less than 8 pounds; Herman says this is because he used the same stringer construction that was used in the rubber band model. He writes, "The performance is outstanding ... [the model] is very fast with a short takeoff of 5 feet. It weighs less than 8 pounds and is covered with Aero Span." A SuperTigre .90 keeps the model in the air.

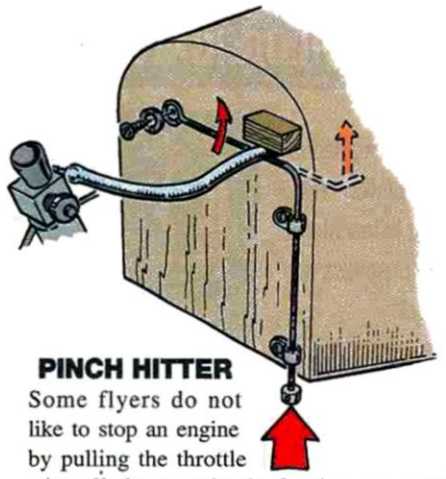
P-39 RENO RACER

Lucky Mustard of North Las Vegas, NV, slightly modified this Jack Stafford P-39 kit to turn the model into a Reno Racer. The 5-pound plane sports a brass exhaust tube and a longer nose to accommodate an S 75 K SuperTigre engine. Lucky says, "... covers ground very quickly ... is fully aerobatic, lands like a dream and flies well in wind." The model is dressed in EconoKote and MonoKote.

Hints & KINKS

by JIM NEWMAN

Model Airplane News will give a free one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman c/o Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.



PINCH HITTER

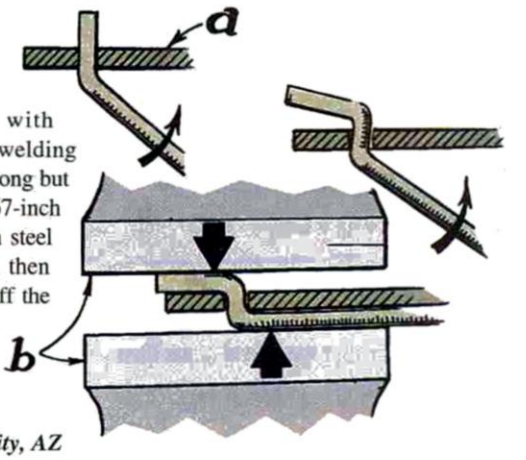
Some flyers do not like to stop an engine by pulling the throttle trim all the way back, fearing an accidental in-flight stoppage. These two versions of a fuel line pinch-off work extremely well. The wire pinch arm pivots on a screw and washer in the firewall and uses loose-fitting nylon landing-gear clips. Check out U-control Rat Racers and free-flight flyers for other versions that can be servo-operated.

Dave Gierke, Lancaster, NY

SQUARE TEES

Make really square Z-bends with 1/16-inch (1.5mm) baling wire or welding rod, both of which are adequately strong but softer than music wire. Drill a 0.067-inch (1.7mm) hole in a piece of 1/16-inch steel (a), countersink the edges slightly, then make the bends as shown. Square off the Z-bend by squeezing the wire and steel tool in a vise (b). A Cox engine wrench is an ideal piece of steel in which to drill the hole.

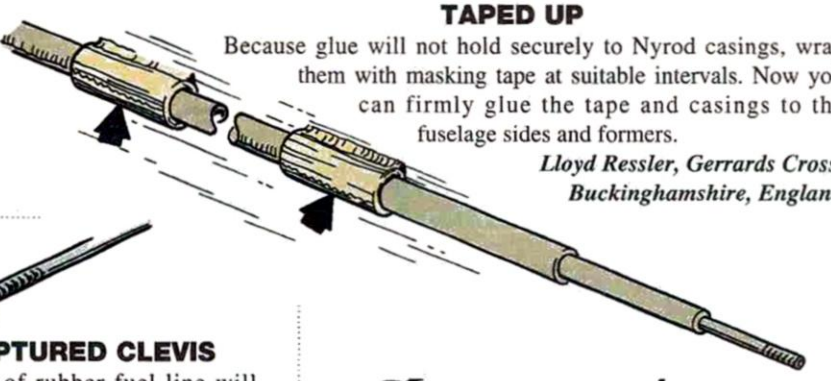
Frank Kelly, Lake Havasu City, AZ

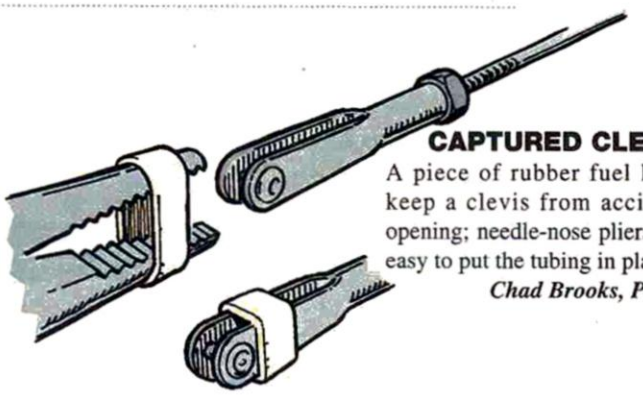


TAPED UP

Because glue will not hold securely to Nyrod casings, wrap them with masking tape at suitable intervals. Now you can firmly glue the tape and casings to the fuselage sides and formers.

Lloyd Ressler, Gerrards Cross, Buckinghamshire, England

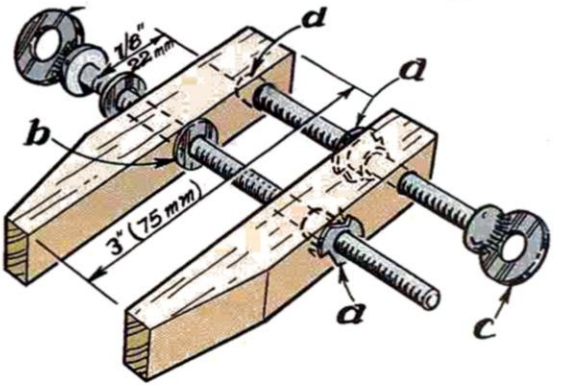




CAPTURED CLEVIS

A piece of rubber fuel line will keep a clevis from accidentally opening; needle-nose pliers make it easy to put the tubing in place.

Chad Brooks, Porter, IN



PARALLEL CLAMPS

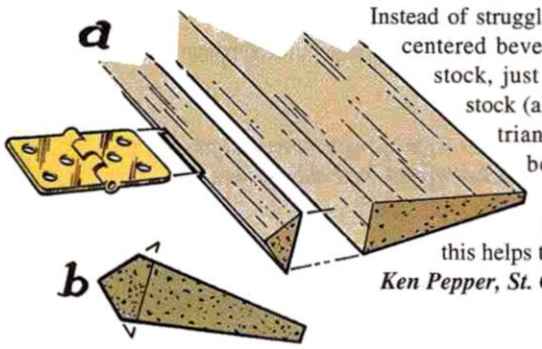
Make these from 3/8-inch (9mm) square beech or maple motor-mount stock, 6-32 screws, blind nuts (a), plain washers and a retaining washer made of a plastic margarine tub (b). Large plain washers (c) are soldered into the screw slots as finger grips. These parallel clamps spread pressure over a larger area and will not mark balsa as do paper grippers. The clearance hole (d) goes only halfway through the wood.

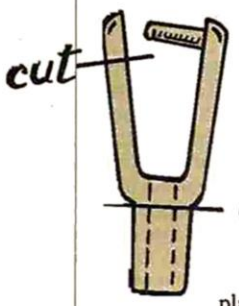
George Carsner, Iowa City, IA

BETTER BEVEL

Instead of struggling to sand an accurately centered bevel on the front of aileron stock, just glue a piece of triangle stock (a) to the leading edge. The triangle can be oversize (b), because it can easily be sanded flush. Note the nice, square trailing edge; this helps to minimize flutter.

Ken Pepper, St. George, Ontario, Canada

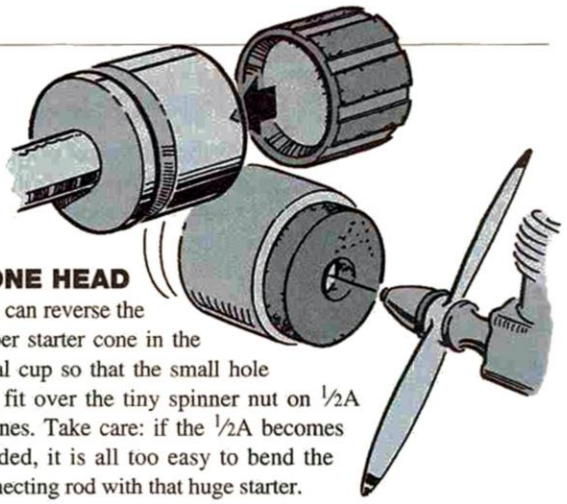




CLEVIS CLIP

Retired clevises make good cable clips for your radio leads. Cut the clevises as indicated, then glue them into holes in the edge of your servo tray or other suitable places on the structure where the wires could pose a problem with the pushrods, etc.

Ken Murray, Balclutha, New Zealand



CONE HEAD

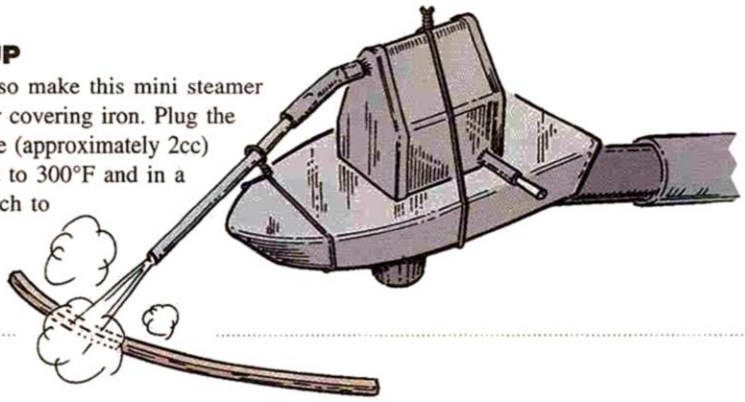
You can reverse the rubber starter cone in the metal cup so that the small hole will fit over the tiny spinner nut on ½A engines. Take care: if the ½A becomes flooded, it is all too easy to bend the connecting rod with that huge starter.

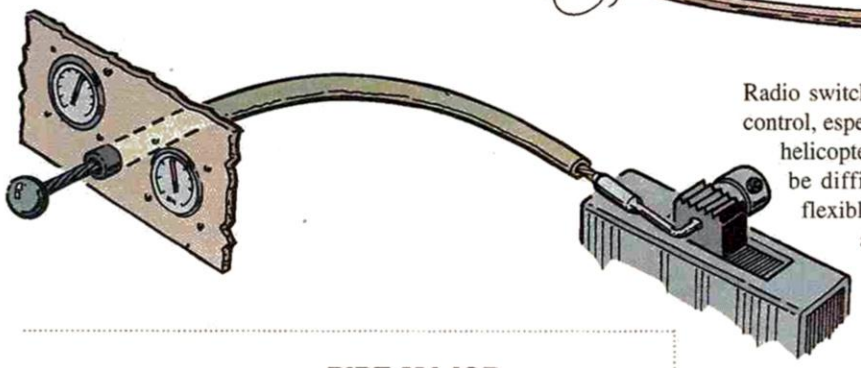
Aaron Broussard, Beaumont, TX

ALL STEAMED UP

Steaming strip wood makes it easier to bend, so make this mini steamer from an old metal U-control tank wired to your covering iron. Plug the two vents with toothpicks, inject about ½ ounce (approximately 2cc) of water into the tank, set the iron's thermostat to 300°F and in a few minutes, you will have a steam jet in which to hold the strip while carefully bending it.

Frank Mandriota, Bayport, IN





REMOTE CONTROL

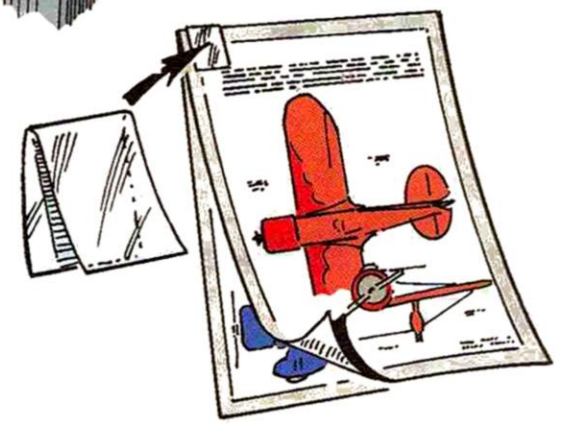
Radio switches can be hidden and operated by remote control, especially in scale models, as shown here, or in helicopters where a convenient switch mount might be difficult to install. This installation shows a flexible cable in a nylon tube that is disguised as a scale push/pull throttle.

Hovik Ghassemian, Glendale, CA

PIPE MAJOR

Cut large drinking straws, cigar holders and other suitable tubes into short lengths, then place them in a clean cat food or tuna can into which a thin layer of white glue has been poured. When the glue dries, these tubes will hold small tools, pencils, brushes, etc. Stabilize the can by hot-gluing it onto a piece of thick ply.

Don Giffen, Sarnia, Ontario, Canada



SLIMMER FILES

If you collect documentation, a lot of paper clips can make your files quite bulky. Instead of clips, use a hinge of clear removable transparent tape. Three or four sheets can be secured this way, and thin tape won't even be noticed in a voluminous file.

Gene Chase, Oshkosh, WI

by DAVE GARWOOD

SOARING in the heartland

THE FIFTH LINCOLN Area Soaring Society Midwest Slope Challenge attracted slope pilots from five states to Russell County, KS, for three days of slope combat and slope racing at a killer flying site in huge wind.

Soar Kansas?!? Yes, Kansas. I was surprised at the number and quality of soarable hills between Topeka and Abilene—more than I've found in 10 years of searching in New York and New England. The natural ground cover is prairie grass; the only trees were planted by settlers. Jim Frickey of Kansas City, KS, reports that there are three soarable reservoirs in the Sunflower State and many more flyable slope sites down south in the foothills of the Ouachita mountains. My high school geography training did not prepare me for this.

THE 1998 MIDWEST SLOPE CHALLENGE

People from other parts of the country might stare in amazement as oncoming drivers wave a greeting. This is beef-eating country; steak dinners cost $6.50 at the one restaurant in town. The Kansas I saw is basic, not stylish; practical, not idealistic. Hotel rooms cost $27, and rental cars are $25 a day. In a way, a trip to Kansas is like visiting an earlier era. All this—*and wind.*

And there was wind. Five days of it, for those of us who came early to the event and left late. Generally 15 to 20mph, some days rising to 35mph and in different directions on different days. Shifting wind direction is not a problem when you fly at a reservoir.

THE RACE SITE

The Wilson Lake site appears to be one of the top 20 slope sites in the country. It's as steep as Point of the Mountain, UT, not quite as tall as Los Banos, CA, and has a better landing area than Point Fermin, CA. One west-facing site reminded me of a miniature Eagle Butte, with another ridge out front, but mega-lift in the valley. Grass-covered, nearly treeless sites surrounding the reservoir are flyable in more wind directions than Sleeping Bear Dunes, MI, or Cape Cod, MA.

We flew at five sites over five days, not counting the reservoir dam itself, which is flyable in two wind directions. The man-made lake has 100 miles of shoreline, surrounded by nearly treeless rolling hills. One ridge has a grass landing strip and is also used by hang gliders.

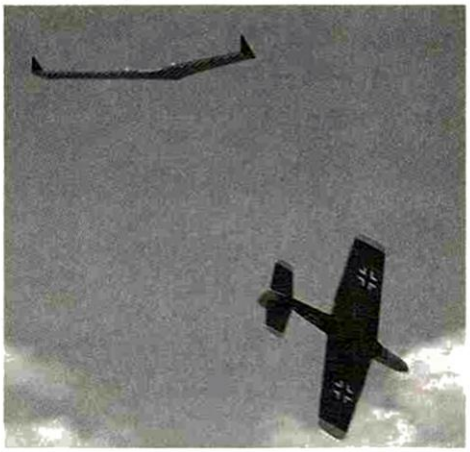
The landlord—the U.S. Army Corps of Engineers—is receptive to R/C soaring events. In addition to water conservation and flood control, the main use of the reservoir is recreation. Site director Ken Wade explained that the Corps is happy to support recreation and sporting events, if conducted within good land- and water-resource conservation practices. Ken gave us an enthusiastic reception during our time at the reservoir.

Left: the edge of the foamie combat site overlooking Wilson Lake reservoir. Above: pilot's view of a cluster of Trick R/C Zagi LEs during the foamie combat match. Right: Dave Sanders and Joe Chovan mix it up with a DAW Foam-51 and a DAW FoaMe-109; Wilson Lake in the background.

PHOTOS BY DAVE GARWOOD


LASS

How about a free hot shower, courtesy of the U.S. government, at the end of a sweaty day of slope flying? Mighty civilized. This is your tax dollar in action.



Trick R/C Zagi LE and Dave's Aircraft Works Foam Wulf-190.

THE EVENTS

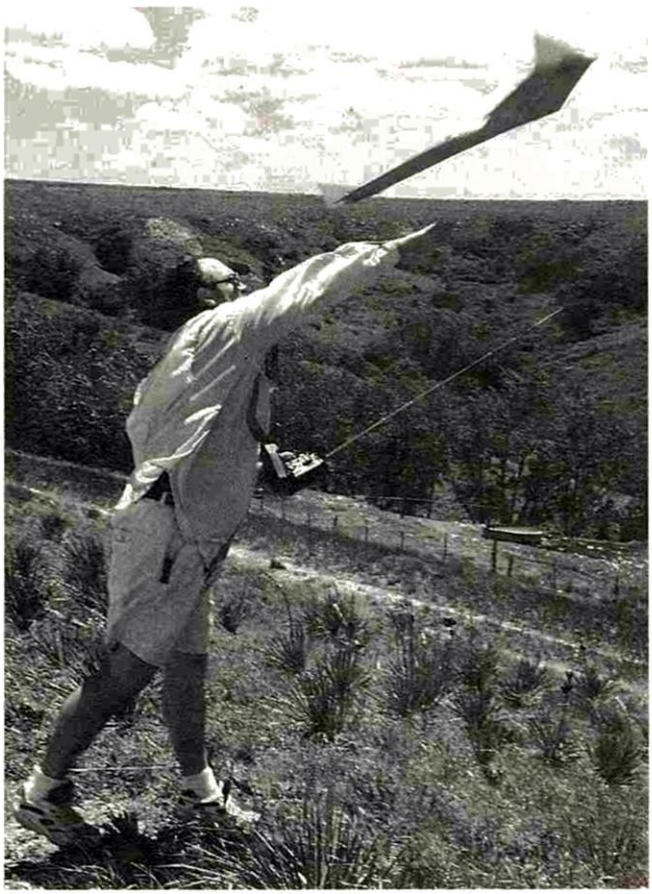
The 1998 Midwest Slope Challenge was held from May 15 through May 17 at Wilson Reservoir in Russell County, KS, and included a day of foamie combat and four classes of slope racing.

Friday featured a combat match organized by Dave Sanders of Dave's Aircraft Works (DAW)*. We had a brisk northwest wind, so we flew from an 80-foot roadside hill just south of the dam. Trick R/C* Zagis predominated, with a few DAW foamie warbirds added to the mix along with a pair of JK Aerotech* Snipers.

California full-contact combat rules were used: kills accumulated in the heats were used to decide the four pilots who would go to the final match. Final standings were decided by placement order in the final match, with ties broken by kills in the earlier heats.

We saw spirited flying by 18 pilots in brisk wind, and we heard laughs, whoops and hollers. These specialized foam planes take an amazing beating—including collisions with barbed-wire fences—are relaunched and keep on flying.

With plenty of lift, furball action stayed high, making kills difficult to come by; the planes had altitude to recover after a collision. Unless a plane hits the ground, no kill is scored. One successful strategy employed by high scorers was the "duck man" technique: fly low and slow, act like a drone and pull high-energy attackers down to your level—and perhaps into the ground. Recovering from odd attitudes after a hit is just as important as making hits in this game.



A pilot launches a Trick R/C Zagi LE.

The third-place finisher was Jim Frickey, who had one kill in the heats and two in the final match flying a DAW Foam-51D and a Trick R/C Zagi LE. Second was Mike Green, flying a Trick R/C Zagi LE, with three kills in the heats and two in the final. I won combat with five kills in the heats and two in the final, flying a DAW Foam-51D.

In contrast to the two previous days, Saturday dawned with no wind. Jim Frickey set up a winch, LASS guys flew an Aerotech* Phoenix rocket-launched glider, and many flew hand-launch gliders while we waited for wind.

At noon, the wind turned on and quickly climbed to a steady 20mph. The LASS crew quickly and efficiently laid out the sighting equipment. Racing began at 1 p.m. with Alden Shipp as race director. Jim Baker and Mike Green ran the far turn flag squad.

First was the Ninja race, with planes limited to the Sig Ninja wing, side view and top view. Considered sportsman or entry-level class, these planes were prepped with strengthened fuselages, ballast systems and colorful paint schemes. Ninja pilots flew five rounds to qualify for the final round, in which the top four pilots flew to decide first through fourth places. LASS ran 26 heats in just under three hours.

A sky full of Zagis during foamie combat match.

All races provided a double-elimination opportunity for pilots. You had to lose two heats to be out of the running. In the end, steady flying by Paul Wright, Tom Wild and Wayne Henning took the first three places.

Flown next was the 60-inch class. A variety of aircraft were flown in this class, from foamies to fiberglass warbirds to specialized racers. Flown in heats of two planes (for safety), the top pilots in the end were Paul Wright, Steve Rohman and Wayne Henning.

Then came the Unlimited class. Anything

WINNERS

FOAMIE COMBAT
1 Dave Garwood ....DAW Foam-51D
2 Mike Green .....Trick R/C Zagi LE
3 Jim Frickey .....Foam-51D and Zagi

NINJA CLASS
1 Paul Wright .....Sig Ninja
2 Tom Wild .....Sig Ninja
3 Wayne Henning ..Sig Ninja
4 Dave Garwood ....Sig Ninja

SAMURAI CLASS
1 Paul Wright .....Sig Samurai
2 Steve Rohman ....Sig Samurai
3 Wayne Henning ..Sig Samurai
4 Duane Huelsman..Sig Samurai

60-INCH CLASS
1 Paul Wright .....Daryl Perkins WHIP
2 Wayne Henning ..Sig Ninja
3 Dave Garwood ....Slope scale Zero
4 John Linke .....Silent Squire

UNLIMITED CLASS
1 Paul Wright .....Daryl Perkins WHIP
2 Ken Hawkins .....NSP Sparrowhawk
3 George Voss .....Sig Samurai
4 Wayne Henning ..Sig Samurai

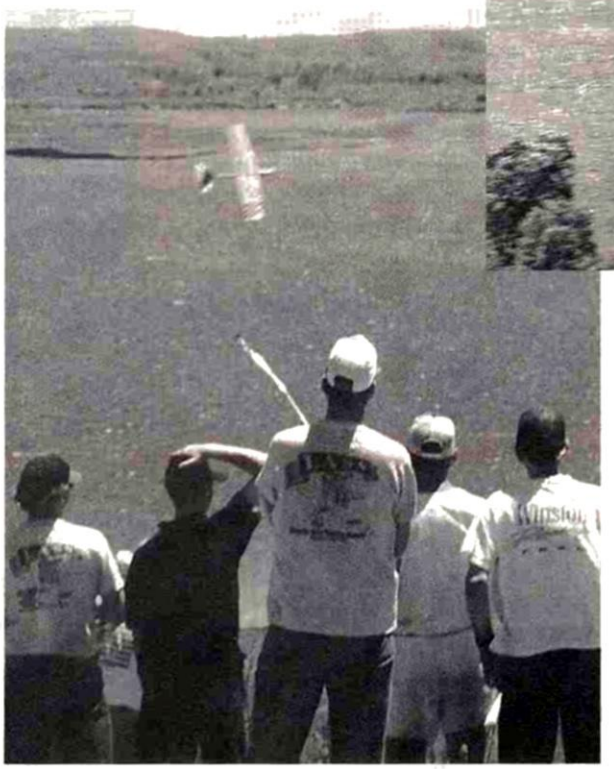
Paul Wright launches his DAW Foam Wulf-190 inverted because this offers a better grip on the sailplane.

could be flown, up to the FAI weight and wing-loading limits. Again, we saw dedicated racing planes along with a slope-scale Zero warbird and a prototype DAW scale KA-6. Spanning 117 inches, this plane will soon be the largest EPP-foam plane in production—a candidate for scale plane training, including aerotow practice.

Lake Wilson showed white caps, and the wind was nearly straight in; it doesn't get any better than this. The top three finishers were Paul Wright, Ken Hawkins and George Voss.

The final race of the day was the Sig Samurai class. The Samurai is a beautiful sailplane, and these planes looked terrific in race paint. The wind settled down to 15 to 20mph, straight into the hill, and this resulted in some of the best and closest racing of the day. Four of the heats were decided by less than the length of one aircraft. The top three Samurai-class finishers were Paul Wright, Steve Rohman and Wayne Henning.

Right: view of the valley in the bowl-shaped race site with two Sig Ninjas on the course during the Ninja race.
Left: near turn action during the Ninja race, looking south. Note the scattered whitecaps on the Wilson Lake reservoir.



When race day was over, the tireless LASS crew had staged 104 heats in four races in seven hours; these guys are good. A few of us who stayed through Sunday and Monday found more hills, more lift and more steak dinners. The 1998 Midwest Slope Challenge was a good show, a good time and a good trip. I'll be back.

For more information, contact Paul Wright, president, Lincoln Area Soaring Society, Route 1, Box 21W, Garland, NE 68360-9322; (402) 796-2175; email: PaulW@isco.com.

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.*

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

Horizon Hobby Distributors

Easy 2 VRTF

by DEBRA SHARP

No experience required!

IT'S EASIER THAN EVER to get started in R/C airplanes now because Horizon Hobby Distributors* has taken trainers to a new level with its Easy 2 model airplane kit. The Easy 2 VTRF (virtually ready to fly) features Ultracote covering and trim, plug-together wing panels, a bolt-on tail group, pre-hinged ailerons, rudder and elevator, and Shock-Loc servo and receiver mounting system. No glues or epoxies are necessary, and the kit includes the one tool—a Phillips-head screwdriver—that you'll need to assemble it. A detailed, well-written instruction manual comes with the kit and features large, clear photos of each step, while two accompanying videos on assembing the Easy 2 and basic field setup guide beginners through construction and show what to expect at the field. Horizon advertises that the Easy 2 can be built in two hours, and I was more than happy to put that to the test.

LET'S GET STARTED

The aileron servo-mounting hole has already been cut out, and you only have to drop in a standard servo and use the provided screwdriver to tighten the screws. The Horizon instruction manual even explains how to add the servo grommets and brass eyelets to the servos—a nice touch. The wing halves are joined by two steel wing rods that slide into hollow metal tubes in each wing; they're held together by rubber bands wrapped around a screw in each hardwood wing spar. An addendum to the original instruction manual explains exactly where to place these screws.

The aileron linkages come with Z-bends and clevises, so you need only to insert each Z-bend into an aileron servo arm and snap the clevis onto the aileron connectors already installed at the trailing edge. Although I used a pin vise to loosen the servo-arm holes to accept the Z-bends, Horizon offers an even easier suggestion in its addendum: use one of the provided servo screws, screw it into the hole three turns and back it out—voilà!

With the wing completed, it's time to move on to the radio installation. One of the unique features of the Easy 2 is its flexible plastic Shock-Loc tray, which isolates the receiver battery and receiver from vibration and holds the throttle, elevator and rudder servos securely in place. The battery and receiver are taped and rubber banded to one end of the tray, and the other end fits over the servos, which are first dropped into a built-in plywood tray in the fuselage. Screw the Shock-Loc tray down, and radio installation is almost complete! The only thing left to do is to insert the on/off switch into the precut hole on the side of the fuselage and screw it into place.

ALMOST FINISHED!

The linkage installation on the Easy 2 is very straightforward, and the instruction manual explains each step in detail. Z-bends and clevises have been added to all the control rods, and the few necessary routing holes have been drilled. The photos in the manual were especially helpful for this part of assembly.

In the past, I've found that attaching tail feathers is one of the most difficult parts of "building" an ARF model. I haven't yet mastered keeping each part square to the others while the epoxy—which is everywhere!—dries. The Easy 2's tail assembly was exceptionally simple: threaded rods installed in the vertical tail pass through holes in the horizontal tail and are tightened with wing nuts. The entire tail assembly is bolted and thread-locked to the back of the fuselage, and the vertical and horizontal stabilizers lined up perfectly without adjustment.

SPECIFICATIONS

Model name: Easy 2

Type: ARF trainer

Manufacturer: Horizon Hobby Distributors

Wingspan: 64¾ in.

Wing area: 712 sq. in.

Length: 52 in.

Weight: 5 to 6 lb.

Engine req'd: .40 to .46 2-stroke

Engine used: Webra .40

Propeller used: APC 10x6

Radio req'd: 4-channel w/four standard servos

Radio used: Airtronics Radiant

List price: $209.95

Features: ARF model with hinged ailerons, elevator and rudder; Shock-Loc tray for servo installation; bolt-on tail group; installed engine mount. "Ticket to Fly" and construction videos and a detailed, photo-illustrated construction manual are included.

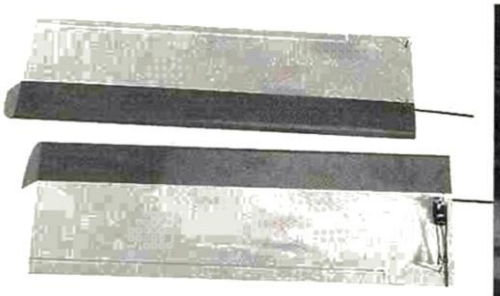
Comments: the Easy 2 couldn't be easier to put together. All the necessary holes have been drilled, all control surfaces have been hinged, the fuel tank has been installed, and the wheels have been mounted on the landing gear. The only tool I needed was the supplied screwdriver.

Hits

- Kit includes all necessary tools and hardware.
- "Ticket to Fly" and construction videos very informative for first-time flyers.
- Ultracote covering is attractive and easy to repair.
- Most clear, detailed instruction manual I've seen yet.

Misses

- None found.

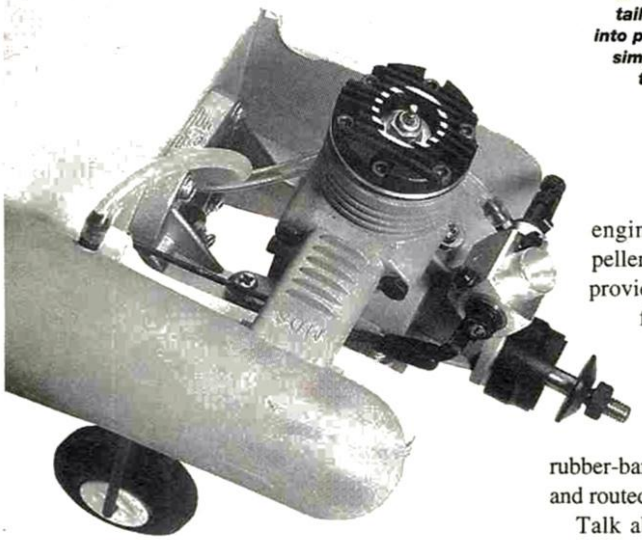


The wing halves are joined with two steel wing rods, and they're held together by rubber bands wrapped around a screw in each wing spar. The wing comes with the hole for the servo cut out and with the aileron linkages installed.

The main gear comes with the wheels already bolted on, so you need only to attach the gear to the fuselage with two 4mm screws and a little thread-lock. Nose wheel installation is just as easy.

POWER UP

The Easy 2 comes with an engine mount and fuel tank already installed. I decided to use a Webra* .40 Silverline for power with a Davis Model Products* muffler. The instructions explain how to clamp the engine in place with the provided hardware and attach the color-coded fuel and vent tubing to the appropriate places on the engine and muffler. Now add a propeller (I used an APC* 10x6) and the provided spinner, and the front end is finished. The wing is attached to the model with rubber bands wrapped around two hardwood dowels that pass through the fuselage, and the antenna is rubber-banded to a length of plastic tubing and routed through the fuselage.



The Webra Silverline .40 engine with a Davis muffler provided plenty of power for the trainer.

Talk about truth in advertising: in less than two hours, the Easy 2 was field ready. The model passed its preflight check with flying colors and balanced correctly without additional weight. Its Ultracote covering and trim scheme are attractive and—if necessary—simple to repair. With its bolt-together construction, clear, detailed instruction manual, building and "at the field" videos, and high level of prefabrication, the Easy 2 is a sure way to get newcomers out to the field quickly, and its stable flight characteristics are sure to keep them coming back. It doesn't get any easier than this.

Addresses are listed alphabetically in the Index of Manufacturers on page 126.

FLIGHT PERFORMANCE

We took the Easy 2 to the field on a warm, nearly windless day and, after checking all the control surfaces and range-testing the Airtronics Radiant radio, we fired up the Webra .40. When the Webra had achieved a reliable idle, I taxied the Easy 2 out to the runway.*

• Takeoff and landing

The Easy 2 taxies straight, and steering isn't a problem. With full throttle, the model took off in 75 feet or so.

Landings are easy; just pull back on throttle to about ¼ power and retrim the elevator for slow flying. The Easy 2 will land at a slow jog, and you should add some down-elevator to prevent it from hopping on the runway.

• General flight characteristics

The Easy 2 is a very stable airplane. Like most trainers, it gains altitude quickly at full throttle. You'll need ¼ to ½ throttle for a comfortable cruising speed. At low speeds, you'll need to add up-elevator to maintain level flight. The Easy 2 doesn't have any tip-stalling characteristics.

You'll need a bit of down-trim for high-speed flight.

• Aerobatics

The Easy 2 is capable of most sport aerobatic maneuvers, such as loops, rolls and inverted flight.

A unique feature of the Easy 2 is this Shock-Loc tray. It holds the throttle, rudder and elevator servos in place and isolates the receiver and battery, which are attached to the end of the tray with double-sided tape and rubber bands.

I spent less than 10 minutes putting the Easy 2 tail together. The control surfaces are already hinged, and the tail pieces slide into place and are simply bolted to the fuselage.

the WORLD Miniature Warbird Classic

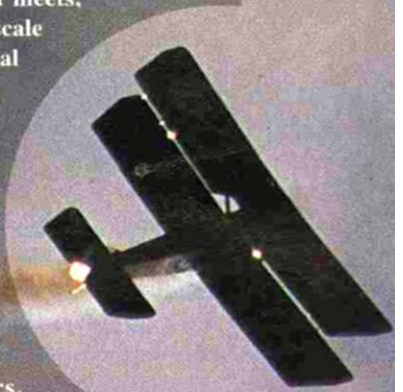
A fly in for military models of all sizes

by GERRY YARRISH

IT IS NOT EVERY day that you witness the birth of something special. New events that start off with all the cards stacked in their favor are indeed few and far between. However, warbird lovers were dealt a winning hand in the form of the first World Miniature Warbird Classic.

Held at the Kirkwood Air Park just south of Binghamton, NY, this warbird meet differs from most in that it has no size restriction. As long as your model has landing gear and can take off and land unassisted (no hand launches), it is eligible to attend. In fact, the World Miniature Warbird Association (WMWA) is founded on the principle that as long as you have a warbird—of any size and degree of "scaleness," from any time period—there should be a place to fly it. This, the first "Warbird Classic," was the great experiment to see whether such an idea would work. The answer to the question of whether giant-scale warbirds can coexist on the same flightline with normal-size warbirds is a resounding: yes!

The architect of the WMWA is long-time scale modeler Dino DiGiorgio of Succasunna, NJ. Dino has always been a warbird disciple and has been a regular participant at many New England giant-scale warbird meets, as well as a Scale Masters and Top Gun scale competitor. It seemed to Dino and several of his warbird buddies that it would be a good thing for warbirds in general if there was some way to combine the efforts of the many regional warbird events under a single "umbrella" organization. Such an organization would have the benefit of a large membership base and might become a unified voice to help warbird clubs and events grow. To appeal to the largest possible number of warbird modelers, a single rule was established: your model warbird must have landing gear and be able to rise off ground (ROG). Dino started the ball rolling by writing a newsletter dedicated to model warbirds and soon established a mailing list of more than 250 subscribers. The idea for the Warbird Classic was first discussed at the 1998 WRAM show, and the date was set when Dino got together with Don Godfrey and Floyd Hamilton, who offered the use of the Kirkwood Air Park facility. With 92 registered pilots, 168 aircraft lining the flightline and over 290 sorties flown the first time out, it appears that the WMWA is off to a flying start.



PHOTOS BY GERRY YARRISH

Above (left to right): Ken Hall brought along his well-used Sterling PT-17. Ken lands the little Stearman as if it were on a wire, even in the windy conditions; here, a couple of old warbird lovers, Nick Ziroli Sr. (left) and Rich Uravitch, try to breathe life into an old O.S. radial-powered Stearman. After a little tinkering, the model (one of the first to be built from the Ziroli plans) was able to put in some flights; Ty Brown loves German fighters; here is his Meister Scale Fw 190. Ty must have been expecting an Allied air attack, as he brought along his own camouflage netting. Left: Sal Urciuoli's North American P-64 in Thailand markings. The G-62-powered fighter was built from modified Ziroli plans. Below: Mike Gross brought along his Ziroli P-40 Warhawk in 325th FG markings. Bottom: John Tanzer brought his very unusual Thomas Morse 0-19C biplane. The 96-inch-span model is powered by an American Eagle 4.2 gas engine.

Built by Bill Steffes, this impressive AT-6 Texan is making the rounds of the giant-scale circuit. Spanning 127 inches and powered by an electric-starter-equipped Quadra 100, Bill's Texan is beautifully detailed. He added functional servo-boost tabs to the ailerons.

ON THE FLIGHTLINE

As is traditional for most warbird meets, the Warbird Classic started things off with a pilots' meeting followed by the national anthem (sung by Kate Smith) piped over the PA system. Front and center was the control tower used as home base for the announcers: Spanky McKay, Ken Taylor and "Scale Techniques" columnist George Leu. Mainly ad-libbed, their schtick (not to mention those very bad jokes!) kept everyone well informed. The flightline was also lined with the flags of all the nations involved in WW II, and period music put everyone in the mood.

The Kirkwood Air Park features a well-manicured sod runway that measures 3,500x80 feet. The mess hall was set up in a nearby hangar, and restroom and shower facilities were available. Sorties started on Friday. Jean Chevalier of Lacolle, Quebec, Canada, made the first official flight with his scratch-built 1/3-scale Ryan ST. Though it was fairly windy the entire weekend, the wind almost always blew straight down the runway.

To serve the needs of the airmen, four flight stations were arranged and assigned according to radio frequency. The traffic pattern was typical racetrack fashion, and pilots were encouraged to

The WMWA commander, Dino DiGiorgio (left), and George Leu take turns behind the mike explaining to the general public what the WMWA is all about.

TUSKEGEE AIRMEN

The P-51B and P-51D have been favorite subjects for modelers who are interested in flying scale models. A demonstration of that came in the form of 16 examples that showed up at this year's WMWA meet. But for me, the prettiest 51s were the "red-tails" flown by the Tuskegee airmen during WW II.

Lt. Paul Mitnaul (center) and Staff Sgt. David Lumberger. That's me on the left.

These proud birds were as effective in protecting B-17s over Germany as they were beautiful. One positive thing that came from the segregation of the armed services during WW II was that the black aviators of the 332nd Fighter Squadron could stand tall and, as a group, proclaim that they never lost a B-17 to enemy fire while they were protecting them. This was an incredible feat that not even those who were against the idea of black aviators could deny. We should all pause to think just a bit about what these brave aviators achieved in the face of insults and prejudice; it was truly amazing.

So when I got to meet two of the Tuskegee airmen at the WMWA meet, I was pretty thrilled. It became even better, as Lt. Paul Mitnaul and Staff Sgt. David Lumberger were such nice guys who were more than willing to tolerate the numerous requests for autographs and the incessant questions.

Now, where are those P-51 plans? Maybe a Speed 400-powered B-model? A Top Flite P-51 would be nice ... I'm not sure what I'll do, but my P-51 *will* have a red tail.

—Larry Marshall

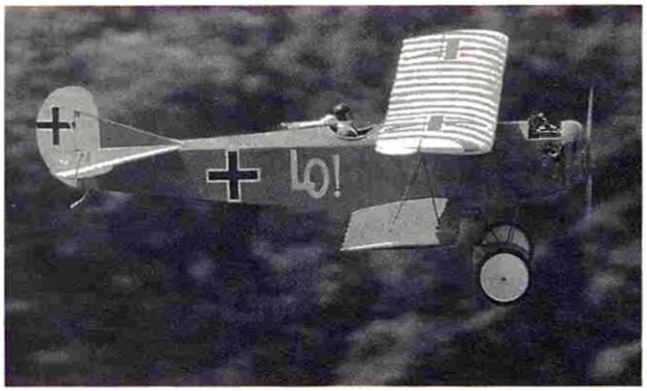
P-51B/C sub-type and serial unknown
TOPPER III, flown by Capt. Ed Toppins,
99th FS/332nd FG, Fifteenth air force

P-51 D-15-NA (NA.109) 44-15569
BUNNIE, flown by Roscoe C Brown, CO
100th FS/332nd FG, Fifteenth air force

P-51C-NT (NA.103) serial unknown
Miss-Pelt, flown by Le. Clarence "Lucky" Lester,
100th FS/332nd FG, Fifteenth air force

P-51D (NA.103) sub-type and serial unknown
Creamer's Dream, flown by Lt. Charles White,
301st FS/332nd FG, Fifteenth air force

ILLUSTRATION COURTESY OF LT. PAUL MITNAUL



Mike Gross plays Ernst Udet in a dogfight with a Sopwith Pup. Mike's model is actually the original Fokker D-VII designed and built by Rich Uravitch. It's powered by a Zenoah G-38.

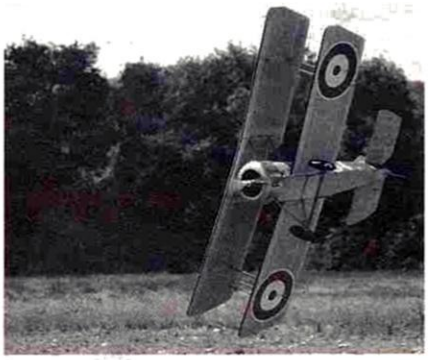
keep their vertical maneuvers over the far field that ran parallel to the active runway. Giant-scale models made large, impressive circuits, while the smaller .40- to .60- and 1.20-size warbirds flew a medium pattern well inside the larger traffic. When smaller fighters went aloft (usually when the wind was really blowing), their small size and the fact that they were harder to see than the giants dictated that they be flown close in. This natural air segregation formed almost by itself, and there was never a complaint heard by any of the pilots. In fact, the great diversity brought about by the various-size models made the weekend all the more enjoyable. The public left knowing that there are many types of models to choose from, if one chooses to try R/C—a fact sometimes lost at type-restricted meets.

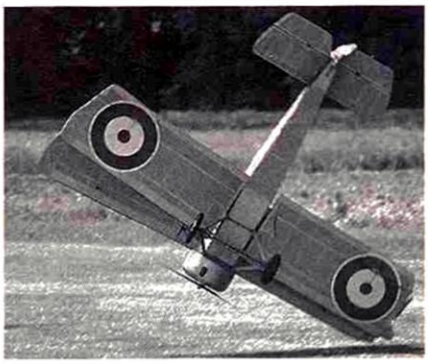
Size alone did not separate the various fighters, as aircraft of all eras were represented. WW I biplanes shared the sky with WW II heavy metal as well as with ducted-fan jets. Even a turbine-powered jet—in the form of Kerry Sterner's DH-100 Vampire—made an appearance on the flightline. By and large, WW II fighters did dominate the event, and it was refreshing to see so many Midwest* "Simple Series" and Dynaflite* sport scale warbirds sharing the sky with big Ziroli* and Meister Scale* warbirds.

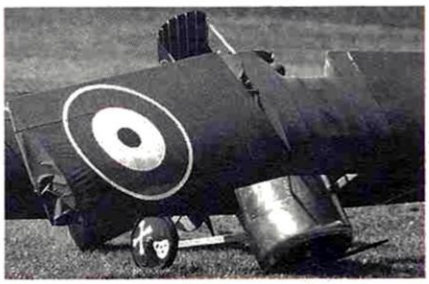
And speaking of old kits, Gerry Promovost of Ottawa, Canada, showed up with an old but very nicely built Sig* PT-19. This all-yellow primary trainer was equipped with flaps and flew beautifully. Several P-51 Mustangs were there, built from Dick Sarpoulis plans, and one in particular was built and flown by 10-year-old Paul Sitler. Paul and his dad, Bill, had a great time flying despite the windy conditions. Several times during the meet, announcer Spanky McKay pointed out to the still-on-the-ground fighter jocks that Paul had the sky all to himself without a wingman!

Several impressive models showed up, including Ty Brown's unusual TA-152. This long-wing FW-190D-9 was developed during WW II for use as a high-altitude recon aircraft and was designed to operate at 40,000 feet. Ty's model started out as a Meister Scale plan and was modified by adding the wing extensions, moving the wing forward 4 inches and extending the nose forward of the wing by 4 inches. Power for the 152 comes from a Quadra 75 turning a 24x8 Zinger 3-blade prop.

Another unique model was a North American P-64 scratch-built by Sal Urciuoli. Sal came with his friends from the LIARS club of Long Island, NY, to show off his unusual razor-back fighter.

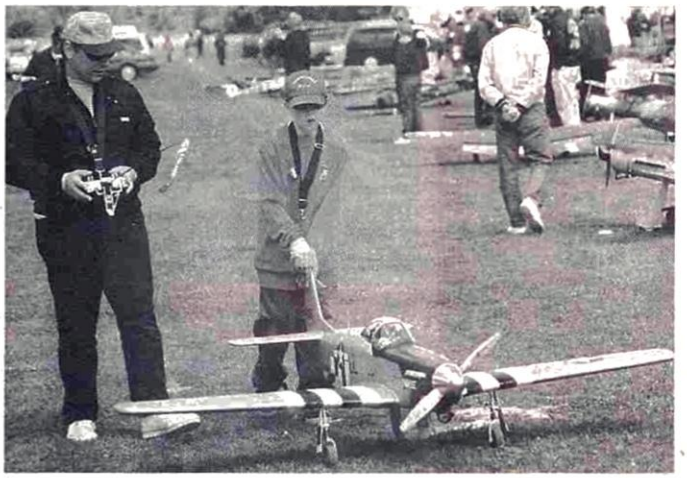






Having just been shot down by Mike Gross's Fokker D-VII, this Sopwith Pup (owned by Sal Calvagna) demonstrates a true-to-scale WW I crash landing! Actually, the Pup is very rebuildable and will be back in the air to fight another day.

Ty Brown of Kannapolis, NC, brought a unique model to the meet: this long-wing TA-152. Built from modified Meister Scale plans, the 152 is powered by a Q-75 and sports a latex paint job. Its wingspan is 144 inches.



WMWA AWARDS BANQUET

On Saturday night, 113 guests enjoyed the awards banquet that was held in the Kirkwood Air Park hangar. The following special awards were given out:

AWARD	MODELER	AIRCRAFT
Pilots' Choice	Bill Steffes	AT-6 Texan
Best WW I aircraft	Bob Allen	Sopwith Pup
Best WW II aircraft	Frank Steinert	P-47 Thunderbolt
Best Jet	Kerry Sterner	DH-100 Vampire

Greatest distance traveled to attend: Ted Galbraith, N. Weald, England

Cadet Wings awarded to: Paul Sitler Jr., age 10; flew seven missions with a giant-scale P-51.

Left: 10-year-old Paul Sitler wheels his Dick Sarpoulis-designed P-51 Mustang back to the pits after another sortie. Paul and his dad had a great time beating up the flying field with several low passes. Paul earned his Cadet Wings at Saturday night's banquet.

Based on a Ziroli T-6 fiberglass fuselage and built-up wings, the P-64 sported Thailand markings and was powered by a Zenoah G-62. Sal clipped the wing to 95 inches and included Robart retracts.

The weekend was indeed a special event, not only for all the great warbirds—and there were many—but also because Dino arranged for several WW II veterans to attend and be interviewed. From B-17 pilots, Mustang riders and two representatives of the famous Tuskegee airmen group to the Me 109G Luftwaffe pilot Gottfried Dulias, we were all privileged to hear firsthand the history these men had fought and lived through. All told, everyone who attended the first Warbird Classic said they would like to come back. If you aren't able to attend next year's meet, then consider forming your own WMWA unit. All you need are two people, a love of warbird models and a phone call to Dino to register. Maybe we'll see a lot of mini-warbird meets next year!

Plans are in the works for next year's WMWA Warbird Classic, and you can get more information on it from Dino DiGiorgio, P.O. Box 175, Succasunna, NJ 07876; (973) 584-6096. See ya on the front!

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.*

WMWA PARTICIPANTS

Don Godfrey	Field coordinator, assistant CD
Bob Drevenak	Assistant field coordinator
George Leu	Planning and announcer
Ken Wilson	Announcer
Spanky McKay	Announcer
Floyd Hamilton	Recruiting and safety
Larry Bartlett	Registration
Lila Smith	Registration
Jerry Behrens	Radio impound
Alicia Putman	Raffle sales
Mike Roselli	Propaganda minister
Frank Pace	Association historian

GUESTS OF HONOR

Lt. Gottfried Dulias	JG 53, Luftwaffe Me 109 pilot, Patchogue, NY
Lt. Col. Gerald Edwards	325th Fighter Group, 317th Squadron, Keeseville, NY
Ens. George Fowle	Pensacola Naval Air Station, Scituate, MA
Lt. Stuart Landon	"Air Apaches," Vestal, NY
Staff Sgt. David Lumberger	"Tuskeegee Airmen," Cranbury, NJ
Lt. Paul Mitnaul	332nd Fighter Group, "Red Tails," Cranbury, NJ
Lt. Col. Franklin Ressequie	8th Air Force (USAF, retired) Binghamton, NY
Lt. Ronald D. Spencer	467th Bomb Group, 788th Squadron, St. James, NY
Staff Sgt. Kenneth Weisl	384th Bomb Group, 547th Squadron, Schenectady, NY

CURRENT WMWA UNITS

- **376th Bomb Group.**
  Contact: Floyd Hamilton, P.O. Box 247, Duanesburg, NY 12056; (518) 755-9482.
- **117th Composite Wing.**
  Contact: Sal Calvagna, 1335 Broadway Ave., Holbrook, NY 11741; (516) 737-6327.
- **325th Fighter Group, 317th Squadron.**
  Contact: Dr. Thomas LaMar, P.O. Box 684, Peru, NY 12972; (518) 834-9437.

WING OR GROUP DESIGNATION UNDECIDED AT THIS TIME

- **Maryland Wing.**
  Contact: Frank Steinert, 7525 Rainflower Way, Columbia, MD 21769-7823; (301) 604-9569.
- **Maryland.**
  Contact: Adam Strausner, 18 Larch Ln., Middletown, MD 21769-7823; (301) 871-4909.
- **Los Angeles Wing.**
  Contact: John Elliot Jr., 802 Knoxville, Huntington Beach, CA 92648; (714) 960-7742.
- **Indiana.**
  Contact: Gregory G. Hahn, 371 E. 1200 North, Lewisville, IN 47352; (765) 645-5015.
- **North Carolina.**
  Contact: Richard Bernier, 6319 NC 49, Mebane, NC 27302; (910) 562-3700.

INTERNATIONAL WMWA UNITS

- **Great Britain.**
  Contact: Ted Galbraith, 43 High Rd., North Weald, Epping, Essex, England CN16 6HW; telephone 011-44-19925-23152.
- **Scotland.**
  Contact: John Mackie, 9 Shanks Rd., Whitburn, West Lothian, Scotland EH47 OHN; telephone 011-44-01501-742322.
- **Germany.**
  Contact: Andreas Gietz, Postfach 1247, D-65371 Oestrich-Winkel, Germany; telephone 011-49-6723-8 7972.
- **Australia.**
  Contact: Rick Rogers, 4 Knudsen St., Elliott Heads, Bundaberg, Queensland 4670 Australia; telephone 071-596131.

CONTACT DINO DIGIORGIO FOR INFORMATION ON FORMING A WMWA WING, GROUP, OR UNIT

Guidelines:

- Your wing must have two or more members who are interested in warbirds of any era.
- Aircraft must be able to ROG.
- Markings and colors should be accurate to the aircraft being modeled and must be in the warbird spirit (no documentation is required).

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

UNBEATEN PATH IMPORTS

Focke-Wulf 190A

by JIM RYAN

1/10-scale electric warbird

SCALE MODELS ARE some of the best applications for electric power, but a problem here in the U.S. has been the limited availability of kits. In Germany, however, there's a strong demand for scale electric models, and German model companies have responded with high-quality kits in a wide range of sizes.

Unbeaten Path Imports* (www.unbeatenpath.com) makes a nice selection of these beautiful kits available to electrics flyers here in the U.S. Its well-organized website has an up-to-the-minute catalog and photos of most of the models. One of its latest offerings is the Focke-Wulf 190A produced by Vöster Modellbau. The Würger (Butcher Bird) was one of the best fighters of WW II, and it has been on my "one of these days" list for years, so I jumped at the chance to build one.

PACKAGING AND PLANS

The Fw 190A comes neatly packed in a single compact carton. I opened the box to find a beautiful gelcoated fiberglass fuselage, foam wing-cores sheeted with Obechi veneer and neatly bagged wooden parts. As is typical with German kits, the hardware package is very complete and of high quality. The part numbers are printed on all the wooden parts, and that makes it very easy to match them up during the assembly.

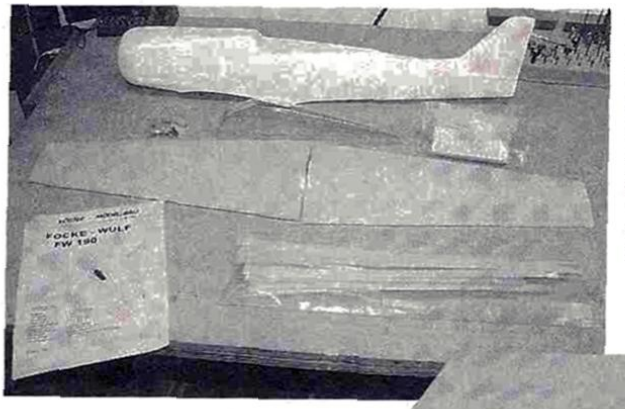
The instruction manual on the review kit was printed in German, but a translated manual is in the works; call UPI to inquire about availability. The assembly steps are simple, and the illustrations were so good that my "restaurant German" was sufficient to keep me out of trouble. Because the model is largely prefabricated, there are no full-size plans.

ASSEMBLING THE WING

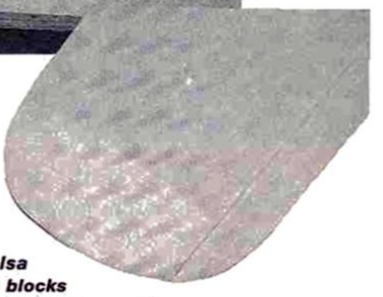
The foam wing-cores come presheeted with Obechi veneer. As an example of the quality of this kit, the veneers on the wings are book-matched, just like on a piece of fine furniture! This ensures a uniform weight and strength distribution between the left and right panels. The ailerons are preslit so

that a hobby knife is sufficient to cut them free. The leading- and trailing-edge (LE and TE) stock is applied with thick, odorless CA and then trimmed and sanded to shape. The balsa tip blocks are installed with thick, odorless CA and then cut to shape with the aid of the supplied template.

Joining the wing panels is simple because the dihedral angle is set when the cores are cut. The strip ailerons use conventional torque rods, which are sandwiched into prerouted channels in the TE stock. I needed to apply some light filler to this joint to get a satisfactory contour. After I had sanded the filler, I applied the supplied glass tape to the dihedral joint with thin, odorless CA.



The kit is complete and of high quality, including the hardware. All parts are numbered and neatly packed.



The balsa wingtip blocks are cut to shape with the aid of a supplied template and then mounted with thick, odorless CA. They're then sanded to the proper airfoil and taper.

The last step in the wing assembly was to drill the holes for the nylon mounting screws as diagrammed in the instructions. My preferred way to do this is to drill the mounting holes first, then install the screws, square the wing to the fuse by measuring from the tail to each wingtip, and then drill the hole for the LE dowel last. Because the dowel passes through a sharp hole in the glass fuse, I substituted ¼-inch brass tube for the wooden dowel and epoxied it into place.

THE FUSELAGE

The molded-glass fuselage is of high quality, and the gelcoat keeps surface preparation to a minimum. I washed the entire fuselage with soap and water to remove the mold-release agent, then lightly wet-sanded the parting seam.

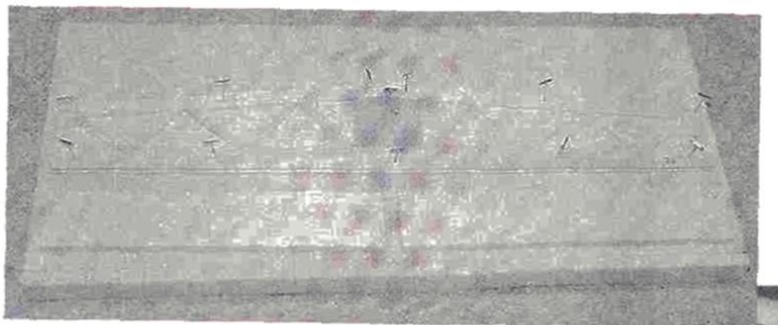
Because of the wide range of potential powerplants, no motor mount is included in the kit, and no provision is made for a battery-access hatch. The manual recommends that you install a 112mm plywood disk as a traditional firewall, but there are countless other options. Because I used one of AstroFlight's* new brushless 05G motors with a gearbox, I installed a front motor mount against the lip of the cowl after using a sanding disk to true up the cowl lip for a tight glue joint. I later ended up cutting a small hatch just forward of the molded exhaust stacks on the left side of the fuse. This small hatch allows me to charge the batteries, and it makes flight preparation much easier.

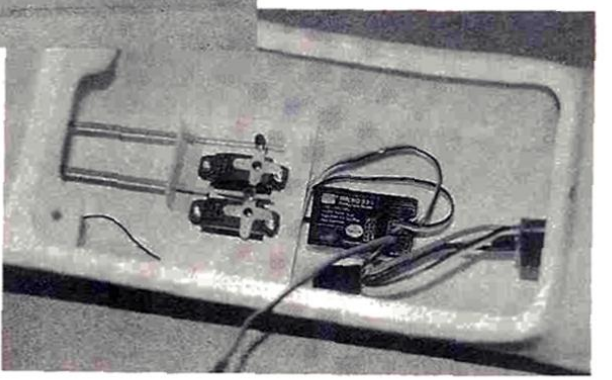
The canopy has molded lines for trimming it to shape. There's a clearly defined lip that runs around the cockpit area on the fuse, and the fit was perfect. This is a really nice touch that simplified what is sometimes a tedious operation. I painted the cockpit area, installed the canopy with RC-56, and then masked the clear sections in preparation for painting the entire airframe.

THE EMPENNAGE

The vertical fin is molded as part of the fuselage, and a piece of balsa is trimmed to shape to provide a rudder hinge post. I recessed this piece by about 3/32 inch to cover the hinge line. The balsa rudder has to be sanded to the proper taper, and I drew guidelines to make the operation more accurate. I mounted the rudder with Robart* hinge points, with the hinge pins buried in the LE of the rudder for a gapless hinge line.

The built-up stab has a lightweight lattice structure sandwiched between two





Above: the stab has a lightweight truss sandwiched between layers of 2mm balsa, and the elevator halves are simple balsa sheet stock. Assembly is so simple that preliminary construction took just two evenings. Right: the roomy glass fuse allows plenty of room for mounting the hardware. The elevator and rudder servos are mounted in the supplied tray, and the receiver and Ni-Cds are secured with Velcro®.

SPECIFICATIONS

Model name: Focke-Wulf 190A

Type: 1/10-scale warbird

Manufacturer: Vöster Modellbau (imported by Unbeaten Path Imports)

Wingspan: 41.3 in.

Wing area: 288 sq. in.

Weight: 40 oz.

Length: 34 in.

Wing loading: 20 oz./sq. ft.

Recommended power: geared Speed 600 with 8 to 10 cells

Motor used: AstroFlight brushless 05G with 8-800AR cells

No. of channels req'd: 4 (aileron, elevator, rudder and speed control)

Radio used: JR* X783 with Hitec* 535 receiver and HS-80 microservos

List price: $200

Features: a molded, gelcoated fiberglass fuse, a foam wing with Obechi veneer and balsa trim and a complete hardware package.

Comments: the Fw 190A is a very high-quality model that can be completed in just a few evenings. Powered by an AstroFlight 05G brushless motor, its flight performance is sparkling, and it looks fantastic in the air.

Hits

- High-quality glass work.
- Careful material selection.
- Excellent canopy installation.
- Impressive performance.

Misses

- Full-size stab plan and translated instructions would be helpful.

FLIGHT PERFORMANCE

While the clear diagrams were more than sufficient for assembling the model, the AltaVista translation website(babelfish.altavista.digital.com/cgi-bin/translate?) was very helpful in setting up the control throws and CG. Translating text is a simple matter of pasting the text in question into the window and clicking the "translate" icon. While not always perfect, the translation is certainly close enough to clarify any questions. Per the instructions, I set the CG 60mm behind the leading edge. Ironically, the brushless motor and battery pack were so light that the Fw turned out slightly tail-heavy, so I disabled the BEC and installed a 270mAh receiver pack to get the CG where I wanted it. The ailerons were set for ±6mm, the elevator for ±8mm and the rudder for ±20 degrees. These throws seem conservative, but the Fw is very responsive, and I found they work very well. The receiver and Ni-Cds were secured with Velcro®-brand fasteners (no damaging vibration in an electric model).

• Takeoff and landing

When the weather finally cooperated, I met my friend John Vago at the field to conduct the test flights. With everything ready, I ran up the motor and John threw the 190 into the light breeze. Wow! With the big prop biting the air, the warbird climbed away without a moment's hesitation. I added a few clicks of down-elevator to check the rate of climb and then added two clicks of left aileron, and the Focke-Wulf was flying hands-off. And, boy, was it gorgeous! To top it off, the geared motor spinning that big prop sounded terrific.

Subsequent flights have shown that the 190 needs only a gentle toss, and it will climb away with power to spare. I find myself steadily pulling back the power, eventually spending most of my time below ½ throttle.

Landings could hardly be easier. With its nice wing loading, the 190 slows to a walk before flaring for a gentle belly landing. I make my turn onto final at ¼ throttle before chopping power for the landing, and the plane slows down nicely. I had no problems with overshooting my landings.

• High-speed performance

With my current 8 cells, top speed for the Fw is about 60mph, and it looks unbelievably realistic for a relatively small warbird. Handling at high speed is solid and predictable. On just my

layers of 2mm balsa, and the elevators are sheet balsa that you must block-sand to the correct taper. The drawing of the stab assembly is reduced scale, and a full-size drawing would be more help when cutting the lattice and shaping the tips.

I used a Zona* disk saw in my Moto-Tool to cut the stab slots in the fuse. To avoid a stress riser where the stab exits the glass fuse, I laminated a 1-inch-wide strip of 2-ounce glass cloth down the center of the stab before glassing it with 0.56-ounce glass cloth and finishing epoxy. After I had glassed the stab, I tack-glued it in place with thin CA and then secured it with fillets of Sig* Epoxolite.

I hinged the elevator halves with the supplied hardware. They're actuated by a wire joiner with an internal control horn—very neat and tidy. This joiner should be slipped into place *with clevis and pushrod attached* before the stab is installed. The rudder is actuated by a conventional control horn.

FINISHING

I covered the wood surfaces with 0.56-ounce fiberglass cloth. Obechi veneer is, by nature, a little rougher than balsa, so to avoid snagging the lightweight cloth, I carefully sanded the wing then wet the wood to "pop" the

MORE POWER!
THE ASTROFLIGHT BRUSHLESS 05G MOTOR

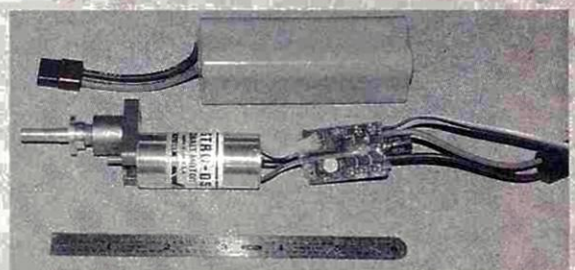
The instant I saw this kit, I knew which motor I wanted to use. At the 1997 KRC Electric Fly, Bob Boucher of AstroFlight was showing the preproduction models of his new brushless 05G electric motor. This lightweight, efficient and versatile powerhouse is just made for an application like this, so I quickly picked up the phone to see about getting one.

The motor/controller combination handles up to 10 cells. The controller is rated at 250 watts and can take up to 30 amps, although Bob recommended 25 amps as a safety margin. With my 5-turn prototype's fairly high kv of 2800 (the production model is an even hotter 4-turn wind), AstroFlight's Superbox, with a reduction ratio of 3.36:1, was a natural for the radial-engine Butcher Bird. The controller includes BEC, so no separate receiver battery is required, but you can disable this feature if you wish.

The predrilled and tapped mounting holes on the Superbox make installation dead simple. I cut a disk from 1/160-inch birch plywood and drilled the appropriate mounting holes, adding a 7/16-inch spacer to keep the prop shaft from extending too far forward. Then I epoxied the mount into the front of the cowl.

After consulting Bob and running some numbers through ElectriCalc, I settled on an 11x9 Master Airscrew* wooden electric prop and 8-800AR cells. This caused the motor to pull just under 23 amps on the test bench, so I knew I'd be safe in flight. At full power, the 11x9 prop spins at 6,300rpm.

With this brushless system, you get the best of all worlds. The system is more efficient than even the best brushed cobalt motors, and it's essentially maintenance-free (just grease the gears every few flight hours). Best of all, the entire system, including connectors, weighs 5.7 ounces, so I saved nearly 4 ounces over an equivalent geared cobalt 05 and controller. The power and efficiency of the system are such that I can throttle back in flight so that flight duration with small 800AR cells is around 5 minutes. With 2000SCR cells, the model gains 5 ounces, but flight duration is more than doubled! One thing is for certain: brushless power is here to stay, and I can't wait to see what AstroFlight brings out next.



The AstroFlight brushless 05 motor with 3.36:1 gearbox is light in weight and high in performance. Other than lubricating the gearbox every 20 to 30 flights, no maintenance is needed.

Motor installation: have you ever seen a simpler motor mount? The brushless 05 motor is mounted on this disk with 4-40 screws, which also make it a snap to remove. To keep the prop shaft from sticking out too far, I added a 7/16-inch spacer block.

second flight, I was happily making grass-cutting strafing runs.

• Low-speed performance
Even at reduced power settings, control remains crisp, and the stall is gentle and straight-ahead. I found no tendency to tip-stall in low-speed turns, but I still keep my speed up on the turn into final. The Fw looks most realistic around ½ throttle, and this also makes for longer flights.

• Aerobatics
On just 8 cells, the aerobatics performance is impressive. Loops are big and round, even late in the flight. With the strip ailerons, the roll rate is very quick. Cuban 8s, Immelmanns and split-S's look great, and with the very effective rudder, the plane does a great hammerhead. It has really amazed me how quickly I've gotten comfortable with this warbird, and I'm looking forward to a great flying season with it.

grain. Then I allowed it to dry and sanded it again. With this preparation and a little care in handling the cloth, I had no problems at all. I thinned the Hobbypoxy* Smooth 'N' Easy finishing epoxy 30 percent with denatured alcohol to speed application and keep weight to a minimum.

After sanding the glassed surfaces, I primed the airframe with Krylon sandable primer and then wet-sanded off as much of the primer as possible (primer is *heavy*). For my color scheme, I chose an Fw 190A-7 that flew with Jagdgeschwader 1 in France. Floquil* military paints are my favorites, and I applied them with my Paasche* double-action airbrush, using artist's frisket masks for the markings. Finally, I applied a light coat of Testor's* Dullcote lacquer to seal the finish. I was pleased to see that the glassed and painted airframe weighed just 18.5 ounces, and with hardware and battery pack installed, the ready-to-fly weight was 40 ounces. Time to go fly!

SUMMARY

The Vöster Modellbau Fw 190A is a high-quality kit that builds quickly. Total assembly time (sandwiched around business travel) was about three weeks, and the finished product is impressive and flies beautifully. If you're looking for a quick and affordable way to get a medium-size electric warbird into the air, look no further. For you dogfighting enthusiasts, UPI also has a Vöster P-51D Mustang in the same size! Tallyho!

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.* +

MODEL AIRPLANE NEWS
HOW TO

A simple monoplane-to-autogyro conversion

Build a Peck Polymers Prairie "Gyro"

by BILL FRIEDLANDER

HERE'S A SIMPLE, fairly easy approach for those who want to try an autogyro. You start with a 3-channel Peck Polymers* Prairie Bird 50, which is a wonderful fun fly airplane that can be built quickly and will do many maneuvers, including flying inverted. On a hot summer's day, the Prairie Bird will thermal like a soaring glider. When you replace its wing with simple, side-by-side dual rotors, you create a respectable, easy-to-fly introductory autogyro—what I call a "Prairie Gyro." The best part is that you can fly the model either way, depending on which lifting surfaces are attached.

Plans and building instructions for the Prairie Bird are available with the kit, so they will not be discussed in detail here. Modifications during construction to facilitate conversion to the Prairie Gyro are outlined below, and drawings for the autogyro lifting surfaces are included.

MODIFICATIONS

• **Adjust the length of the nose section.** Since autogyros need quite a bit more power than conventional aircraft, a .15- or .20-size engine is used instead of an .049 or .051. A Thunder Tiger* .15 with an APC 8x4 prop seems to work well. Although a .20-size engine would ensure good autogyro performance, a .15 provides *plenty* of power for the fixed-wing configuration!

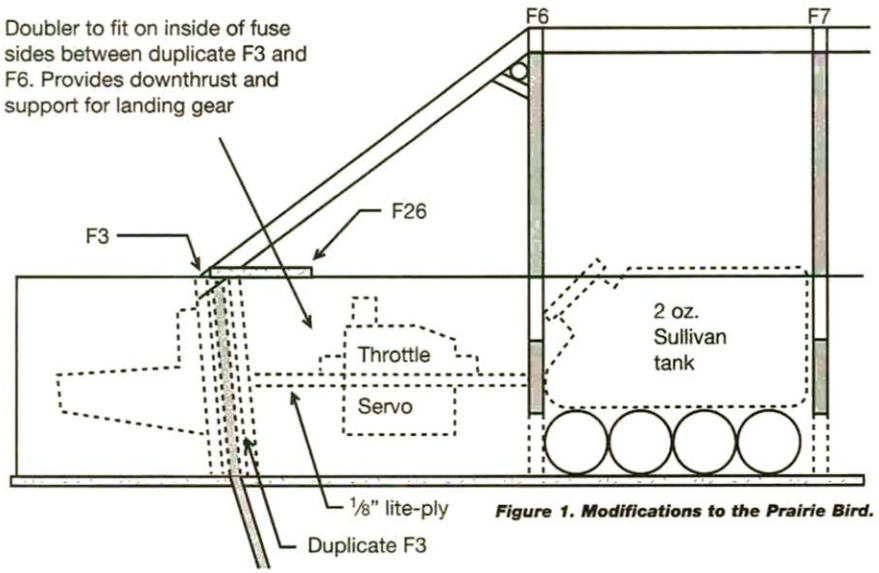


Figure 1. Modifications to the Prairie Bird.

• Because larger engines are heavier, the nose section of the model should be shortened. Moving the firewall (F3) to where the landing gear emerges from the bottom of the fuselage is a good start.

• **Position components to achieve CG location at F7.** The parts placement is as follows: rudder and elevator servos on a lite-ply platform between F9 and F10; receiver packed in Styrofoam and foam rubber between F7 and F8; 4-ounce fuel tank between F6 and F7; battery (four M cells) under the fuel tank; throttle servo on a lite-ply platform between F5 and F6.

It's a good idea to have already constructed the stabilizer, elevator, fin and rudder so they can be positioned first. The engine should be next, then the fuel tank (which should be positioned at the CG so fuel will not affect the CG location) and so forth. The last item to be placed should be the battery because its weight can be used to offset the required positions of the other components.

• **Landing gear.** To minimize ground looping during taxiing and takeoffs, bend the landing gear back.

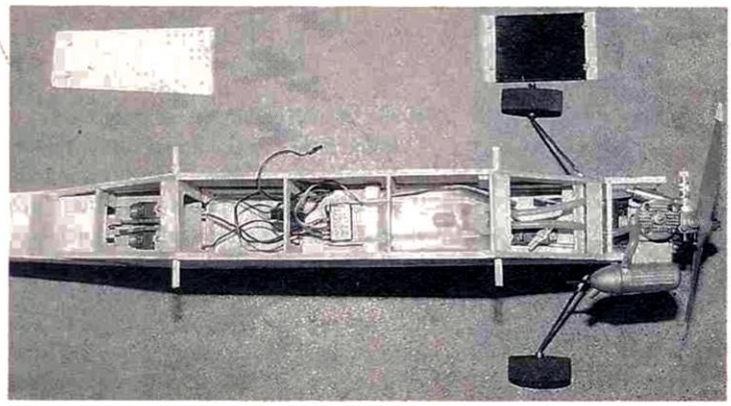
• **Cabin treatment.** The plans show that part F19 has cutouts to represent the cabin windows. I suggest that you don't remove these but instead CA them in to provide a

more robust support area for the wing and autogyro attachments. Windows can be simulated with black paint.

Removable panels are also installed as the front windshield and the top of the rear sloping deck between F9 and F11 to allow access to the servos.

• **Add extra 1/32-inch ply doublers.** The plans call for F18 as a doubler where the forward and aft sections of the fuselage sides are joined. F18 should be replaced with 1/32-inch ply doublers on the inside from F9 to F12.

• **Install triangular blocks to support the vertical fin.** Triangular blocks (3/8 to 1/2 inch on a side) should be installed along the length of the base of the vertical fin to provide a stiffer, more rugged attachment point for the fin.



Top view of fuselage parts replacement. Note the position of the firewall relative to the landing gear.

• **Install a steerable tailskid.** In place of the fixed skid shown on the plans, install a 1/16-inch-i.d. brass or aluminum tube running vertically from where the fixed skid emerges from the bottom of the fuselage to the top of the fuselage. The top of the tube should be aligned with the hinge line of the rudder. A 1/16-inch piano wire with a 1/2-inch-long, right-angle bend should be trapped between the screws that hold the rudder servo horn. Form the lower portion of the wire into a smooth rearward curve to allow the model to easily slide over grass but to still provide positive directional control while tail-dragging.

AUTOGYRO ROTORS

Model autogyros seem to perform satisfactorily when their disk loading is less than 6 ounces per square foot. Disk loading is the area of the rotor disk in square feet divided by the weight of the aircraft in ounces. In the case of the Prairie Gyro, each rotor has a diameter of 25 inches, and together, they provide a disk area of 6.8 square feet. The completed weight of the aircraft is about 37 ounces without fuel, giving a disk loading of 5.4 ounces per square foot. Adding only 1/2 inch to each rotor blade lowers the disk loading to about 5 ounces per square foot. The diameter of the I-beam rotor supports should also be increased to prevent them from clashing at the centerline of the aircraft.

BLADE CONSTRUCTION

The rotor blades have Clark-Y airfoils. Each blade is 12 inches long, 3/16 inch thick and has a 1 3/4-inch chord and can be made with two pieces of 3x36-inch hard balsa. Sig Mfg.* offers partially preformed balsa airfoils that can be used as well. The rotors used in my Prairie Gyro were made by gluing 3/16x1/2-inch pieces of spruce as the leading edges (LEs) to the balsa aft section of each blade. The blades were then shaped using a Clark-Y airfoil template (CompuFoil*) and vacuum-bagged with 1.5-ounce fiberglass laid on the bias. This provides a glass-smooth surface for the blades; this is important to attain autorotation. The blades can also be covered with heat-shrink tubing or MonoKote*.

Prior to covering, epoxy 1/32 ply doublers (3/4x1.5 inches) onto the top and bottom surfaces of each blade at its root. These doublers should be centered on a line that is 9/16 inch (30 percent of the chord) back from the LE. This provides a reinforced section for mounting the blades to the rotor hub. Be sure to make three blades that will have clockwise rotation and three that will have counterclockwise rotation! Drill two 7/64-inch holes, 3/4 inch apart along the 9/16-inch line back from the LE, with the innermost hole about 3/8 inch out from the root of each blade. These holes will accommodate the 4-40 nylon bolts used to attach the blades to the rotor-hub plate.

ROTOR-HUB PLATE

The dimensions of the rotor-hub plate are shown on the drawings for the gyro conversion. The hub material can be 1/16 ply or 0.040- to 0.060-inch polypropylene sheet. The hub can have some flexibility to allow the blades to "cone up" as they generate lift, but the material must be stiff enough to resist the pitching force of the Clark-Y. This is important for maintaining the blades' proper angle of incidence in flight.

The blades should be mounted with their 30-percent chord lines placed over lines that radiate from the center of the hub plates and 120 degrees apart. The inner end of each blade should be 1/2 to 9/16 inch out from the center of the hub plate. The blades are mounted on the plates with 4-40 nylon bolts that will shear if a blade strikes the ground.

The angle of blade incidence relative to the rotor shaft is critical. For a Clark-Y, a 3- to 4-degree shim between the underside

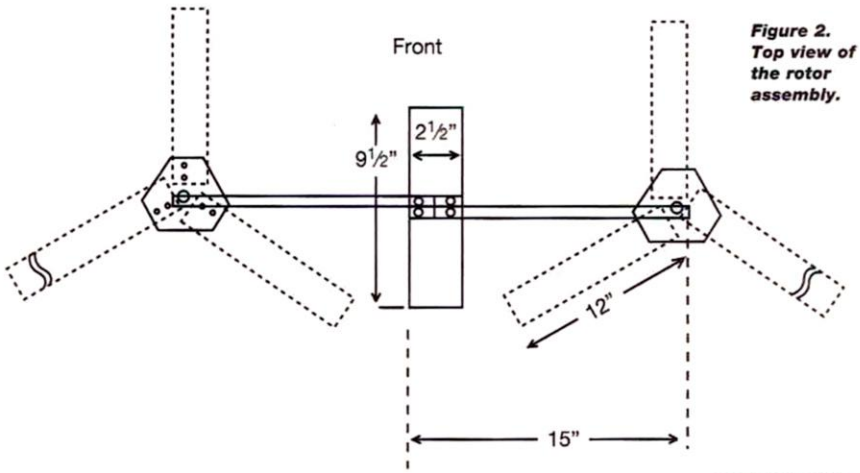
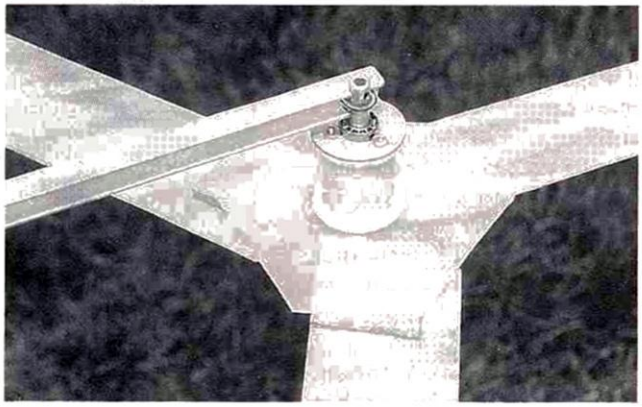


Figure 2. Top view of the rotor assembly.



View of the rotor hub from below. Note the four shims between the hub and the underside of the blades. Also note the rotor shaft captured in the notch by a 2-56 U-bolt at the end of the rotor support beam.

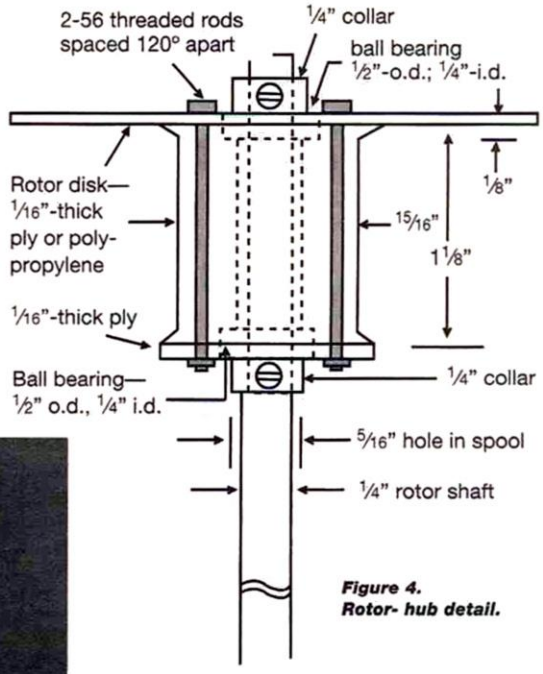


Figure 4. Rotor- hub detail.

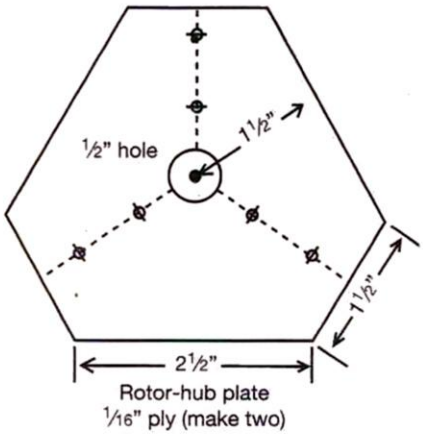
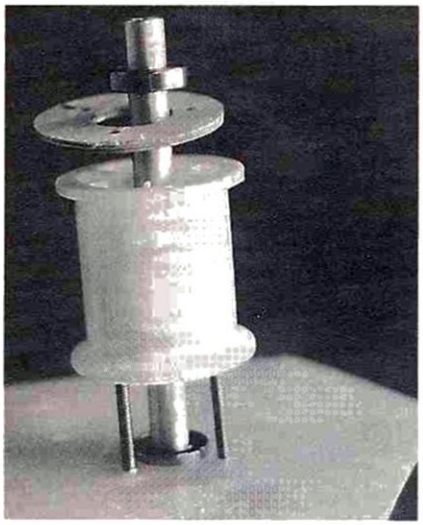


Figure 3. Rotor-hub plate (1/16-inch-thick ply). Make two.



Rotor hub before final assembly.

of the blade and the rotor-hub plate is usually about right. The shims should be placed to provide *negative* incidence, i.e., the trailing edge (TE) should be above the LE. Use Ernst* engine-mounting shims or cut your own out of basswood.

The correct amount of negative incidence can be determined by starting with -4 degrees. Mount the rotor, hub assembly and rotor shaft to the supporting I-beam. Take the assembly outside. Then hold it so that the plane of the rotor is vertical and the wind passes through from the bottom of the blades, and observe how the rotor spins up. With a -4-degree shim, the rotor should self-start, spin slowly and eventually very rapidly spin up to high speed—called the "autorotation condition." Try to estimate the lifting force that the rotor generates, and reduce the shim to -2 or -3 degrees. Again observe it spin up. If the rotor doesn't start by itself, give it a spin by hand. If it then goes into a very rapid spin, you have just about optimized the incidence angle. The lifting force in this condition should be greater, too.

The correct blade incidence is a compromise between the ability of the rotor to self-start and its ability to achieve maximum rpm and lift in the autorotation condition. Some commercial gyrocopters actually use a few degrees of *positive* incidence!

BUILDING THE ROTOR HUB

The rotor hubs are made out of plastic sewing-thread spools. Ball bearings fitted to each end of the spools provide smooth, low-friction rotor rotation. The bearings can be fitted into the spool ends by drilling a recess in the ends of the spools. Cut a 1/16-inch-thick ply disk with an outside diameter equal to that of the spool rim, and drill a ½-inch-wide hole in its center. The rotor-hub plate, which also has a ½-inch-wide hole in its center, is at the top of each spool. The lower disk and upper hub plate are held in place with 2-56 threaded rods. The bearings at the ends of the spools are held snugly in place in the spool recesses by the ¼-inch collars on the rotor shafts.

If you have a drill press or lathe, you can make hubs out of ⅝- to ¾-inch nylon rods instead of using spools. The hubs are slipped over the rotor shafts (¼-inch-o.d. hardened, 6061, T-6 aluminum tubes), which in turn are mounted in notches at the ends of the ⅜-inch aluminum I-beams. The hubs are held on the rotor shafts with standard collars or small aluminum rings that are retained by 2-56 bolts in holes drilled through the rings and the aluminum tubes.

I-BEAM ROTOR SUPPORTS

The members that support each rotor are made of 14¾-inch-long, ⅜-inch aluminum I-beam material. Carbon-fiber, ½-inch-diameter tubes would also be feasible. File, drill, or mill a ¼-inch-diameter notch at the outer end and into the side of each support. Drill 3/32-inch (or no. 44) holes at right angles to each notch to accept a 2-56 threaded rod bent into a U shape. The rotor shafts are then captured by the U-bolts.

Each rotor-beam support is attached to the platform with a double-tapered basswood wedge; this produces a 7-degree "dihedral" to the I-beam support and tilts each rotor shaft back 10 degrees. Two 4-40 bolts spaced about 1⅝ inches on either

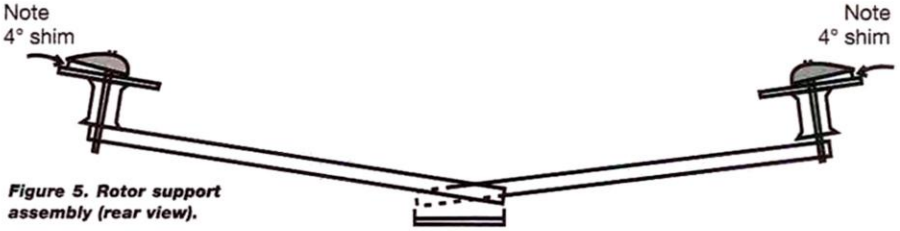


Figure 5. Rotor support assembly (rear view).

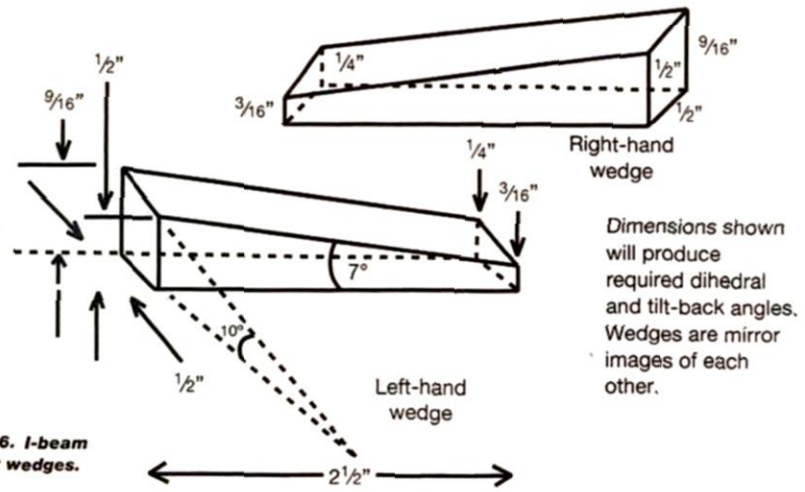


Figure 6. I-beam support wedges.

side of the I-beam are used to attach the beams through the wedges onto the beam support platform.

SETTING THE HANG ANGLE

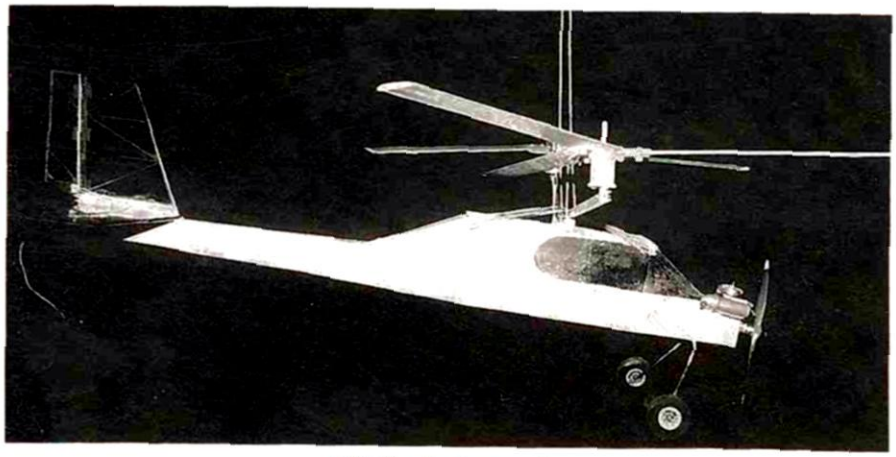
As a rule, model autogyros require a CG that's forward of the rotor shafts or rotor attachment point. To determine the proper position of the rotor-beam supports, mount them as described on a rotor-beam support platform that is 1 or 2 inches longer than required to fit between fuselage formers F6 and F9. Attach the platform to the fuselage with rubber bands, then hang the plane with string looped around the support beams at the fuselage. Slide the support platform forward or backward until the 10-degree nose-down hang angle is achieved. Glue two blocks underneath the platform and just inside formers F6 and F9. Cut the platform to meet the front of the windshield and the aft sloping deck.

ATTACHING AND BALANCING THE ROTORS

Experience has taught that dual, side-by-side-rotor autogyros will fly more smoothly when the forward-going blades are on the "inside" (viewed from above, the left rotor turns counterclockwise and the right rotor turns clockwise).

The rotors will spin up to and over 1,000rpm, and it is important that each rotor be balanced to avoid having excessive vibration. Clamp the rotor-beam support plate in a vise so that each rotor's plane is vertical. Spin each rotor gently and observe where each stops. Turn each rotor 90 degrees and see which way each turns. If one blade consistently ends up at the top when the rotor stops, add weight by wrapping vinyl tape around its tip at the LE. If one blade seems always to settle at the bottom, add tape to the other two blades.

Continue this balancing until the rotor blades can be placed in any position and will not move. If the rotor is badly out of balance and tape is not sufficient to balance it, drill 3/23 holes in the LE of the light blade at its tip and insert short lengths of solder. It's a good idea to test-balance by using Scotch tape to hold the solder pieces at the blade tips and then cut the solder bits until balance is achieved. It is *critical* that the drilled holes lead from the LE toward the TE so the solder pieces won't fly out when the rotor spins.



Adjusting the hang angle.

FLYING THE PRAIRIE GYRO

Since autogyros generate lift from their rotating blades, it is critically important that the rotors are "at speed" before you attempt to lift off. Takeoff runs are usually quite long. Many model autogyros have crashed because the pilot attempted to take off, mistakenly thinking that it was ready to fly when the ground effect was really providing support. After flying a few feet into the air, the model flips over, breaking blades, or worse!

The proper takeoff technique is to taxi or place the Prairie Gyro at the end of the field facing into the wind (more wind is helpful!). Give each rotor a spin in its proper direction. Hold the elevator control back so that the tail stays on the ground, and begin to taxi slowly (about 1/2 throttle) into the wind, observing the rotors as they pick up speed. Then relax the backpressure on the stick and allow the tail to come up.

Advance the throttle fully and let the plane accelerate on the wheels. Apply only the very slightest backpressure to the stick until the model lifts off. If it hasn't lifted off by the end of the runway, chop the throttle and return to the start. Next time, hold the tail down a bit longer and taxi slightly faster until the rotors appear to pick up more speed. Then release the backpressure and allow the tail to come up and accelerate on two wheels as before. In all cases, allow the plane to lift itself off in a more or less level attitude.

After takeoff, maintain full power. Try to maintain a gentle climbing attitude, making slow, gentle turns. To avoid losing orientation, try to keep the plane close to you. Initially, keep the nose no more than about 10 degrees up (less is better). Control altitude with the throttle. Try gentle turns, figure-8s, etc.

To land, approach from the downwind end of the field into the wind, and reduce power until the plane begins to sink. Keep the same level fuselage attitude. When the plane is within a few feet of the ground, apply very slight backpressure on the stick and increase power. This will slow the plane's forward motion and, at the same time, cause the rotors to spin up; this will provide more lift and a gentle touchdown in a 3-point attitude.

Have fun with your new autogyro!

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.*

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

A SPORT-SCALE WW II TRAINER

by GREG GIMLICK

THE PT-19 FAIRCHILD has to be one of the most recognized planes of the WW II era, and although not a combat aircraft, it certainly played a huge role in the outcome of the War. Fairchild Aircraft Co. developed the primary trainer in 1938 to satisfy the military need for a monoplane trainer and continued production of the PT-19 and its variations until 1944.

The Global Hobby Distributors* version is almost ready to fly when it arrives. The box is huge, and everything is well packed. When you open the box you understand why it's so big: the wing is one piece. The model is beautifully covered in Ultracote, and the fiberglass cowl is gorgeous. I quickly inventoried everything and started to read the instruction manual, which is nicely done and has photos. An addendum sheet provides some very important corrections, so be sure to read it and make notes in the manual where appropriate.

GLOBAL HOBBY DISTRIBUTORS

Fairchild PT-19 ARF

SPECIFICATIONS

Model: Fairchild PT-19

Type: sport scale

Manufacturer: Global Hobby Distributors

Wingspan: 56 in.

Wing area: 500 sq. in.

Wing loading: 23 oz./sq. ft.

Length: 43 in.

Weight: 5 lb. (advertised 5.4 lb.)

Engine req'd: .40 to .53 2-stroke

Engine used: Magnum 52XL FS (4-stroke)

Radio req'd: 4-channel

Radio used: Futaba 8UAF with four standard servos

List price: $230

Features: the airplane is completely covered with Ultracote, and the wing is already joined when it comes out of the box. The fiberglass cowl is prepainted and of exceptional quality. Very sturdy balsa-sheeted foam wing. Very short construction time: less than 10 hours.

Comments: I love this ARF—no bones about it. The model is easy to build and flies great. I struggled with some wrinkles in the fuselage covering but was able to get them smoothed out.

Hits
- Great workmanship.
- Ultracote covering.
- Complete package.
- Easy-to-follow instructions.
- Flight characteristics.

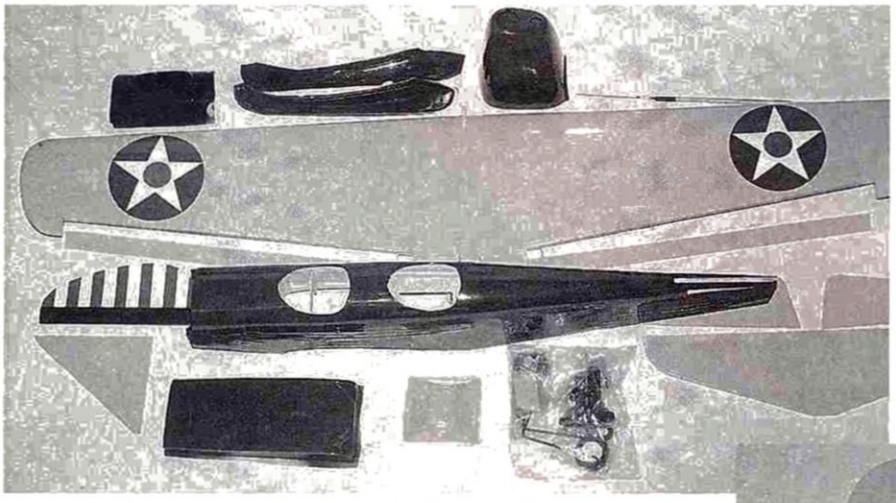
Misses
- Wing fillets difficult to trim and fit.
- Windshield material looks milky.

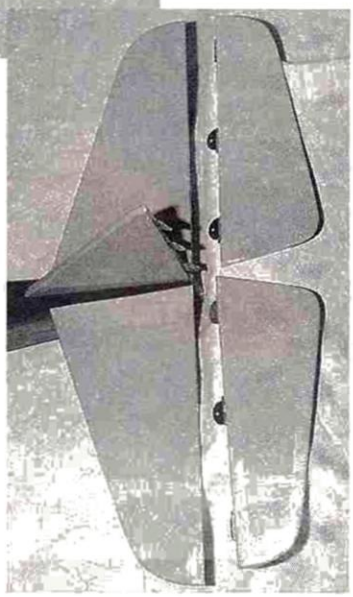
PHOTOS BY GREG GIMLICK

Greg Gimlick poses with the Global PT-19.

WING AND EMPENNAGE ASSEMBLY

Hinging the ailerons is about all that you have to do to the wing. The mounting holes are predrilled, so you only need to cut the covering over the holes to bolt it to the fuselage after you glue the ply reinforcement over the trailing edge. You have very good tips on getting everything lined up, with diagrams of where to measure to ensure that it's square. After the stabilizers have been glued into the fuselage slots, hinge them with the provided materials. Bolt the tailwheel assembly to the fuselage and secure the tiller arm to the rudder.





Above: the PT-19's parts as they come out of the box. Right: assembling the tail feathers is quick and easy.

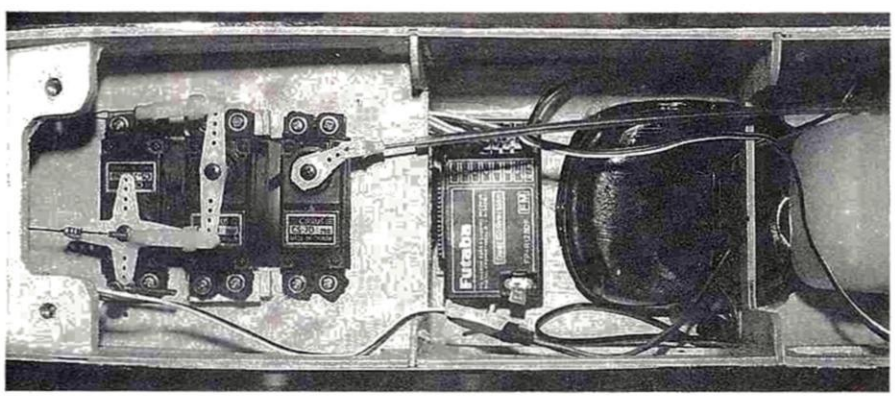
to trim the plastic belly pan to fit, and because it ends up being almost completely flat against the wing, I think a blue piece of Ultracote would have had the same visual effect and would have been much easier. The hinges are round metal devices unlike any I have seen, but they seem to work fine, and the usual caution of protecting the hinge line from glue should be heeded. The slots are cut already and only need to be opened up with a knife. There are no surprises for installing the main gear, as they are simply bolted into the wing blocks. The servo is installed in the center of the wing and attached to the torque rods.

The next step is to assemble the vertical and horizontal stabs. You'll need to cut away some of the covering to provide a good gluing surface. The manual gives

ENGINE AND RADIO INSTALLATION

Engine mounts are provided in the kit, and the installation is well documented in the manual, but take care to check the addendum sheet because the measurements in the book are wrong. After the mounts have been bolted to the firewall, trial-fit the engine. This will allow you to see how it will match the front of the cowl. I used a 4-stroke, which made the model a bit nose-heavy when I installed it in the position given by the manual. The manual also instructs you to install the engine inverted so it can be concealed in the cowl; this will work nicely, but I chose to install the engine sideways; it's easier to keep the engine running that way.

Radio installation is fast and easy, as trays with the appropriate holes for standard servos are supplied. Global has even put in small shims to raise the rudder servo up enough for the pull/pull cables to clear the elevator servo behind it. The only thing I changed was the cable provided for the rudder hookup; it wasn't coated, and when I cut it to length, it frayed too much to be fed through the crimp collets. If you've never done a pull/pull system, this is an easy way to learn, as the process is described well and everything is ready to use.



You need only drop the servos into the tray and screw them in.

COWLS, COCKPITS AND FAIRINGS

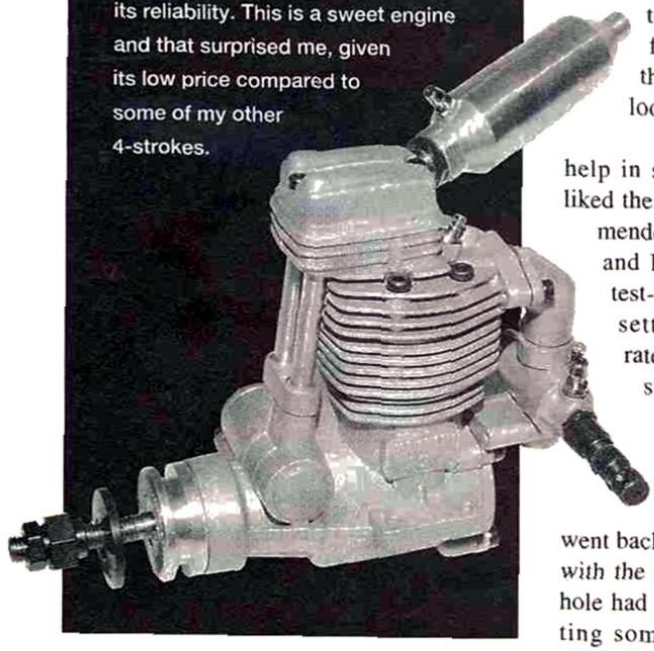
Each cockpit arrives in the form of a molded plastic tub that you need only glue into place. I had to tape the piece down while the PFM* dried because it needed a bit of pressure to stay in position. When the PFM cured, it was there for good, and the same applied to the windshield pieces. I didn't like the cloudy plastic material Global used for the windshields; they appeared milky. The fiberglass engine cowl is a work of art and is already painted to match the Ultracote, so be careful when trimming it for your engine (it would be a shame to mess up this cowl!). The cowl fit the fuselage perfectly, and there's quite a bit of leeway for you to adjust it to fit your engine installation. Now for the wing fillets; nice idea, but one I think would have

MAGNUM 52XL FS

The newest offering from Magnum* Engines, the 52XL FS, proved to be a perfect match for the Global PT-19. It's a standard, single-cylinder, overhead-valve engine with dual-needle carburetor. I broke it in according to the manufacturer's recommendation using a 10-percent nitro and 20-percent oil fuel to spin a 12x5 on the test stand. The APC 11x7 prop I've been using on the model pulls the plane around with authority, but for more scale-like flight, I intend to try a 12x5 or 6.

The instructions are thorough and detail how to adjust the valves when that becomes necessary, so if you've never done it, don't be afraid. Magnum has followed its practice of supplying both a prop nut and a lock-nut to secure the prop. If you lose one, the thread is standard ¼-28, so it's easy to find. After my engine had been broken in, I found it easy to start with only a chicken stick and Ni-starter.

The 52XL is very quiet with the supplied muffler, and more than once when it was throttled back and coming toward me, I thought it had quit, but a touch of throttle proved otherwise. With proper carb adjustment, it responds well in a vertical attitude, and I've come to have a lot of faith in its reliability. This is a sweet engine and that surprised me, given its low price compared to some of my other 4-strokes.



FLIGHT PERFORMANCE

• Takeoff and landing

If you're used to taxiing a tail-dragger, you won't have any surprises, but I recommend bending back the tailwheel wire somewhat to lower the tail. After I did that and put the plane in a more tail-down attitude, the handling improved. I replaced the small main wheels provided with the kit because I fly off grass, and they were just too small. We had a crosswind the first day I flew it, but there was enough rudder authority when the tail came up to keep it tracking straight, and the liftoff was uneventful—just the way I like them. Landing the plane is no problem, as it slows down fairly well, and both main wheel touchdowns and 3-point landings are possible.

• High-speed flight

This is a model of a primary trainer, but it does go much faster than scale speed when you want it to, and the handling is fine. The rolls are relatively quick and axial for a plane with this amount of dihedral. In fact, the first time I did a fast roll, I gave it a tad of down-elevator as it went inverted, and it climbed through the rest of the roll; lesson learned. It will give you some vertical performance, but don't expect an Extra 300 flight, even at high speed.

• Low-speed flight

The plane slows nicely for landing, and with a bit of power, it didn't seem to have any tendency to stall. I tested the stall at altitude, and it is much more of a mush than a stall. The model continued to just mush along (nice to see no wingtip drop!) until I stopped it. While breaking in the motor, I had a dead-stick and managed to stall the plane in a turn back to the field, so I was able to see how it would snap (which it did due to pilot error). Recovery would have been nicer with a bit of throttle, but it does come out after a couple of spins.

• Aerobatics

With the Magnum 52XL 4-stroke, the PT-19 has more than enough power to try anything you want. Although Fairchild didn't plan for students to do knife-edge, this trainer will do it if you increase the rudder throw. Everything else is fair game, and the airplane responds well throughout the envelope. Loops are nice and big, and slow rolls are pretty. It takes some input to get a spin started, and recovery is easy with the engine still running. It's no Extra, but it will do everything I would expect of a low-wing primary trainer.

been better left off. I found it hard to trim them so they fit well enough not to have some pressure on them when the wing is installed. If I left some space, they looked funny; if they were close to the wing, I couldn't get a good bond to hold them in place. After a few flights and after I'd lost one of them, I removed them. The plane looks fine without them.

The manual provides plenty of help in setting all the control throws. I liked the fact that Global provided recommended settings for high and low rates, and I found them to be very good. I test-flew the model with the low-rate setting and then changed to high rates, which livened it up nicely. Be sure to check your pull/pull system to make sure that the cables are tight and that the threaded rod through the rudder is secure. After a few flights, I went back and glued the rod in place along with the nuts and washers, as I found the hole had elongated slightly and I was getting some rudder play. Once that was fixed, the system remained solid and responsive. I balanced the model at the recommended location and found it to be a bit nose-heavy, so I moved the battery into the tail by cutting a small hatch and avoided having to add any weight. The model weighed exactly 5 pounds—just under the projected weight of 5.4 pounds.

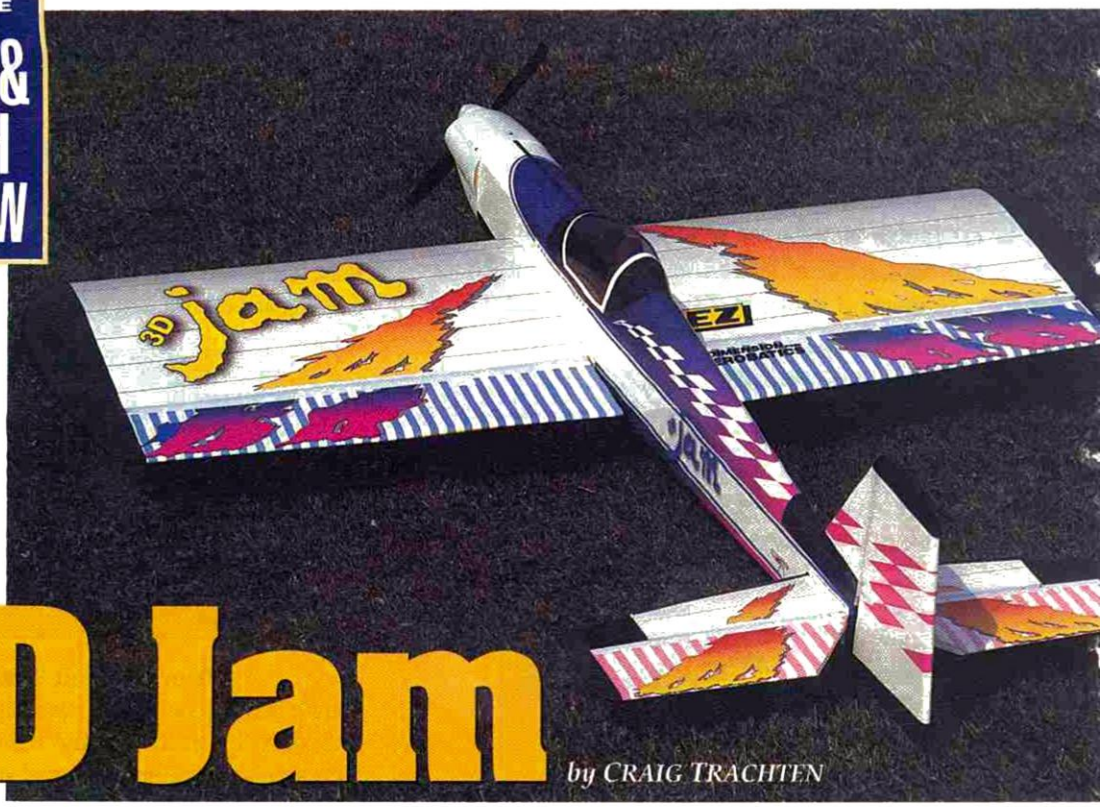
CONCLUSION

It's no secret among my friends that I like the concept of ARFs, but I do tend to be critical of their construction when I think corners have been cut, or quality control is poor. ARFs give us the chance to get in the air quickly and can be a real plus when you want a scale plane and don't have time to build one. I'm impressed with everything about this kit except the plastic fillets and belly pan, but that's trivial; both can be left off without adversely affecting the plane's performance or looks. Global has outdone itself with this entry into the market, and I have to say it's the best ARF I've assembled so far.

*Addresses are listed alphabetically in the Index of Manufacturers on page 126.

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW



The EZ 3D Jam, distributed by Magma Intl., is a sweet, aerobatic ARF airplane with the fuselage of a pattern ship and fun fly wings. It is well built, easy to assemble and a great-looking model that everyone will love to fly.*

EZ 3D Jam

by CRAIG TRACHTEN

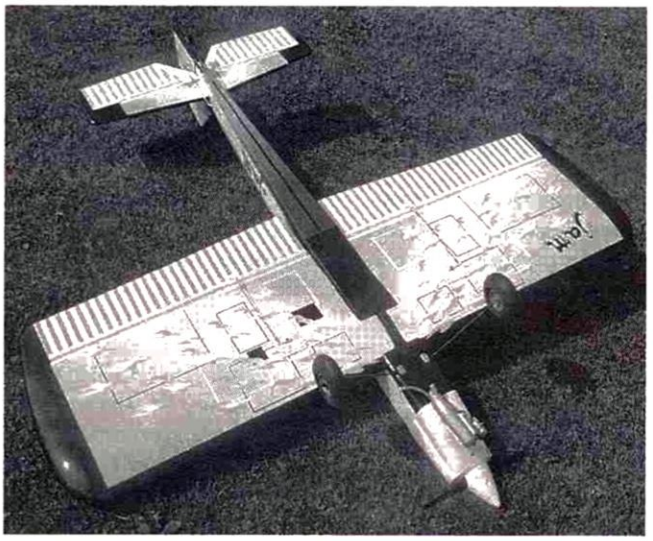
WING ASSEMBLY

"Easy" is the operative word here. The wing comes in one piece with the wingtips attached. You must drill five holes in the wing to hinge each aileron. The drill points are marked, but check them. I first installed the hinge points in the wing and, when they were dry, I matched them to the drill marks on the aileron. One of the marks was off a tad, so I re-marked it and then drilled it. It's always easier to check and make adjustments before you start to drill. Mark and install the plywood control-horn mounting plates, then the control horns. Epoxy the ailerons and the front mounting pipe to the wing, and have a cup of coffee while they dry.

The aileron servo openings have already been cut out, but you will need to open them to the edges of the ribs. Mount your servos in the plywood mounting plates, then trial-fit them into the servo openings. Because the wing is sealed, you must snake the servo lead through the wing and to the exit hole before you epoxy the servo plate into place. I found that a servo extension wire on the servo made this task easy. When you epoxy the servo plate into place, make sure the servo case is just below the top surface of the wing. If you mount it too low, you won't be able to use the cover plate; mount it too high, and the cover plate will bulge. I used one of the plates as a guide, making sure the plate was mounted flush and the output shaft protruded so the servo arm was unobstructed and could be mounted securely. When everything has dried, attach the servo cover plates to the wing with double-sided tape. Measure, mark and install the pushrods as instructed.

You do actually get to build something in this kit: the wing-mounting plate, which is made of six pieces of ply glued together with thick CA. When the plate has dried,

insert the two supplied blind nuts. I chose not to use the 3x40mm Phillips-head screws that came with the kit and used 10-32 blind nuts instead. Nothing is more annoying than a stripped screw that makes dismantling tough or next to impossible! Trial-fit the wing-mounting plate to the fuselage, and when you're happy with the fit, epoxy it in place with at least 30-minute epoxy. I used 2-hour epoxy; longer is stronger. Insert the wing-mounting bolts into the mounting plate, making sure the heads of the screws are just above the side of the fuselage. Ink or paint the head of the screws, and before the ink/paint dries, put the wing in place and press down on the trailing edge. This will mark the drill holes for the mounting screws. Attach the wing-bolt plate to the wing with thin CA, and attach the wing to the fuselage. Trim and fit the wing bottom cover plate until you are satisfied with the fit. The instructions suggest using thin CA around the edges to secure the plate to the wing. Whenever I secure plastic trim pieces, I run a bead of CA gel well within the outer lip of the part, making sure none will ooze out when the trim piece is mounted. After the CA gel has cured, I lightly lift the lip of the trim piece and wick in a water-soluble adhesive, such as RC-56. I don't worry about this adhesive oozing out because a damp paper towel will take care of it, and the glue dries clear. Using this method, you'll have a secure, good-looking trim piece.

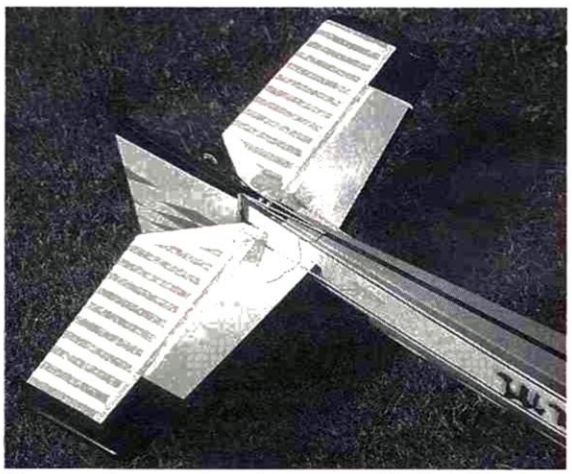


The underside of the Jam is brightly colored, making it easy to see.

ENGINE MOUNTING

Engine installation doesn't get much easier than this. A rail-and-plate-type engine mount is supplied. Insert the mounting screws through the predrilled holes in the firewall, place the radial mount on the screws, and add a few locking washers and nuts. The mount is now secure. Attach the mounting plates to the rails, place your engine on the plates so the thrust washer is 120mm (4.75 inches) in front of the firewall, and mark the position of the engine-mount holes.

For power, I used my favorite engine, an O.S.* .46 FX. Remove the plates and drill where marked. Attach the plates to the engine with the supplied hardware. Before I attached the engine to the mount, I secured the ball from a ball-link set to the throttle arm of the engine. I prefer to use a ball link instead of a Z-bend for the throttle. Attach your engine to the mount, and drill a hole through the firewall for the throttle-control rod. CA the throttle-rod chase to the firewall.



There aren't any surprises when you assemble the tail feathers.

The supplied fuel tank was a little too small for my liking, so I stuffed in a Great Planes* 10-ounce tank. I do mean stuffed! It took a little doing—trimming and fitting—but I got it to fit. The extra flight time and reserve fuel to avoid making dead-stick landings are worth the effort.

SPECIFICATIONS

Manufacturer: EZ; distributed by Magma Intl.

Model name: 3D Jam

Model type: aerobatic ARF

Length: 57.4 in.

Wingspan: 53.8 in.

Wing area: 859 sq. in.

Weight: 6 lb., 11 oz. (as flown)

Wing loading: 17.93 oz./sq. ft.

Engine req'd: .40 to .46

Engine used: O.S. .46FX

Props used: APC 11x5, 11x6

Radio req'd: 4-channel

Radio used: Futaba 8UAF transmitter and receiver pack; FMA S360 high-torque servos and Tetra receiver

Fuel: Omega 15%

List price: $315

Features: complete hardware supplied with kit; very good documentation with clear photos; big plus were the factory cutout marks on the cowl.

Comments: the 3D Jam is a little pricey but well worth the investment. It is a well-built ARF that should give you many hours of flying fun.

Hits
- Looks great.
- Well built.
- Easy to assemble.
- Excellent flying machine.

Misses
- The supplied wing-mounting hardware—3x40mm Phillips-head screws—is easy to strip.

PHOTOS BY LARRY MARSHALL & DEBRA SHARP

FLIGHT PERFORMANCE

• Takeoff and landing

Throttle up slowly and the Jam will climb out slowly and uneventfully. Punch the throttle, and the Jam jumps off the ground. Either way, the aircraft didn't surprise me and was quite manageable. Landings were a piece of cake. You can fly the Jam to the ground under power and come in for a scale landing, or you can coast in at an idle and float to the ground.

• Low-speed flight

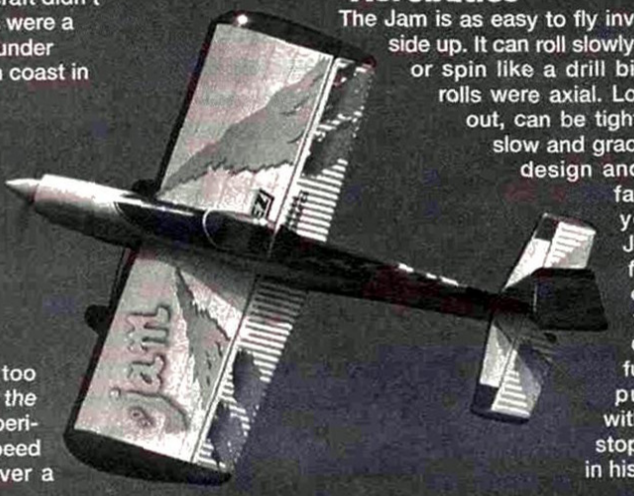
This is where the Jam excels, and it's why it is now my favorite aircraft. It will stay airborne at high idle. This aircraft showed absolutely no bad tendencies. When the Jam stalls, it goes nose down and the wings stay level. Add power and a blip of up-elevator, and off you go.

• High-speed flight

The Jam is extremely responsive—sometimes too responsive—at high speed. This is why I reduced the elevator and rudder throws. At times, the Jam experienced severe empennage flutter during high-speed passes over the field. Loss of control was never a concern, as the Jam is an exceptionally stable aircraft, but it made a hell of a racket. The model went vertical, and I pulled back the throttle until it stalled. It went from nose up to nose down without a twist or turn. Up-elevator was all that was needed to achieve level flight.

• Aerobatics

The Jam is as easy to fly inverted as right-side up. It can roll slowly and gracefully or spin like a drill bit. Either way, rolls were axial. Loops, inside or out, can be tight and quick or slow and graceful. The wing design and control surface size allow you to fly the Jam like a fun fly model. One of the guys at the field is a competition fun flier, and he put on a show with the Jam that stopped everyone in his tracks.

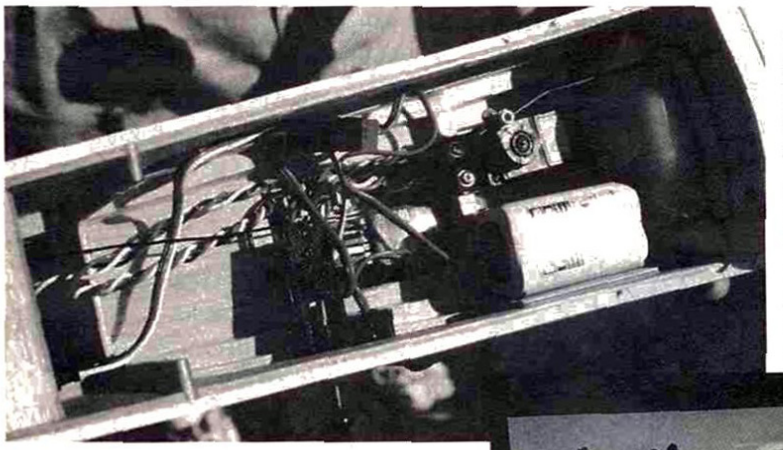


FINISHING UP

You'll need to do a little building to attach the main gear. Four pieces of ply are CA'd together to create the landing-gear plate. Before attaching it to the fuselage, epoxy in the two landing-gear blocks. Make sure the holes are offset. Place the plate over the blocks, mark, and drill for the landing-gear wire. Now epoxy the plate to the blocks and the fuel-tank floor to the fuselage. Trial-fit the nose, and when you're pleased with the fit, attach it to the fuselage. Insert the main gear wires and secure the gear with the supplied landing-gear straps. Mount the wheels, and you're good to go.

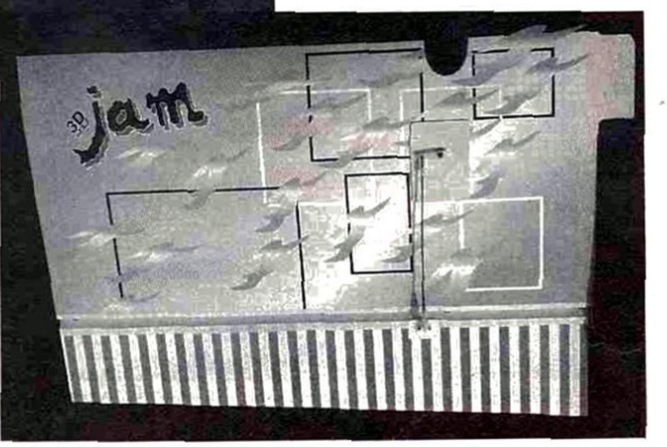
The 3D Jam comes with all the necessary hardware for making the elevator and rudder pushrods. I'm sure the supplied pushrods would be just fine; however, I opted to use Dave Brown* fiberglass pushrods. I did construct them to the sizes given in the addendum. Installation was a snap. A helpful hint: when you install the pushrods, take the pushrod chases and insert them from the tail end toward the servo tray. Place the pushrod ends into the chases and push; the pushrods will follow the chases right out the tail end.

Assembling the tail feathers is not unlike the assembly of the main wing; same steps, different parts. Follow the documentation; there are no surprises.



Left: the roomy fuselage easily contains all the radio gear.

Below: the aileron sevo hatches are covered with plates that are attached with double-sided tape.



The radio compartment is roomy, and this makes installation easy. I used FMA* S360 servos (a little overkill) and an FMA Tetra receiver. They fit nicely and functioned flawlessly. A Futaba* 1000mAh receiver pack supplied the power.

Cut the canopy along the mold line, and it will fit perfectly. I used canopy glue to secure the canopy to the fuselage. A pilot under glass is a nice touch; I decided to use a sport pilot from Hangar 9*. The cowl was the least painful I have ever installed. All cutout areas are marked by the factory, and they exactly matched the O.S. .46.

TO THE FIELD

Attach your favorite prop and the supplied spinner, adjust your throws, and you're ready to go. I found that the recommended elevator and rudder throws were a bit too much. I set my high rates at 75 percent of the recommended throws and my low rates at 50 percent of that. The Jam and I were much happier. Radio setup was a no-brainer with my Futaba 8UAF.

The EZ Jam 3D from Magma Intl. was an absolute pleasure to assemble and fly. It's a little on the pricey side; however, the quality of material and ease of construction make it well worth the price. The Jam has become my favorite aircraft and will be flown on every trip to the field.

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.*

Pober PIXIE

by BOB TAYLOR

An unusual, sport scale parasol design with great performance

While at a friend's house, I was looking through some old literature on homebuilt aircraft in the hopes of finding a subject for a new model. I wanted a nice-looking, easy-to-fly scale model, and when I found the Pober Pixie, designed by Paul Poberezny—founder of the Experimental Aircraft Association (EAA)—I fell in love.

I brought the literature home and started to scale up the drawings for an O.S.* .52. The first thing I did was change the wing. The full-size plane was powered by a Volkswagen engine, so the wing was very long and used a Clark-Y-type airfoil. I like to do a few aerobatics, and the O.S. .52 develops more than enough power, so I shortened the span and used a symmetrical airfoil.

The only difficult step with this type of plane is the cabane struts. The full-size struts are made of chromoly steel tubes, so to duplicate their appearance, I made mine from 1/8-inch music wire. I roughened up the wire with a file and then epoxied the parts into a block of wood. It takes 27 pounds of pressure to pull the wire out of the block; six cabane struts and four lift struts hold the wing on, so I figure the wing will never come off. If you follow my sequence, you should end up with a very well-aligned airplane.

DRILLING THE CABANE BLOCKS

I developed an easy way to drill the holes straight through the cabane mount blocks (see plans). The blocks are laminations with spruce on the outside and an 1/8-inch-square balsa core in the center. The drill easily follows the soft balsa center when you drill the long hole into which the wire is epoxied.

For easier access to the inside of the fuselage, I made the fuselage top (from the cockpit forward) removable. This portion, as well as the cabanes and the

wing, is all one piece. This gives you a plane that's easy to build and easy to service. The cockpit section is planked and covered—as is the bottom of the wing—before everything is glued together. The aileron servo is mounted on the bottom rear of the cockpit in the fuselage. The servo drives the ailerons just as in the full-size plane, and long pushrods exit the fuselage through the turtle decking.

TAIL GROUP

Start by cutting a form that is 1/4-inch smaller than the outside shape of the tail; I used craft-store foamboard. Then cut 1/4x1/16-inch-thick balsa strips and soak them in hot water and ammonia. Bend them around the form and let them dry. To keep everything straight while drying, I fastened my form to a piece of plywood.

When dry, these strips are glued together to form the outside shape of the tail surfaces. I glued the entire fin/rudder and stab/elevator tail structures as single units, then cut off the elevator and rudder when the structures were done. Pin the laminated pieces over the plans (cover the plans with wax paper) and install the rest of the framework. Be sure to install the 1/8x1/4-inch spruce joiner piece to strengthen the stab as called for on the plans. To join the elevator halves, I used a length of 1/4-inch-diameter dowel. If you wish, you can use a music-wire joiner. After the tail surfaces had been shaped and sanded smooth, I hinged them with MonoKote hinges.

FUSELAGE

I built the fuselage in four basic parts or sections, similar to the way the full-size airplane is built. There are no bent-wood or laminated parts used in the fuselage. I used 3/16-inch-square spruce for the longerons and hard balsa for the cross-braces. While you are framing up the first section, notice that it is covered on the inside with 1/8-inch lite-ply and that the right fuselage side is shorter than the left side to give the proper amount of engine side-thrust; some downthrust is built in.

Cut and install the crosspieces, and be sure that the top and bottom pieces are the same length. Draw centerlines on the bottom and top crosspieces and use a square so everything comes out straight. The bottom of the front fuselage section is covered with lite-ply, and this should make everything pretty much self-aligning. Note that the second fuselage section does not have a lite-ply bottom. The landing-gear mount blocks go across the bottom longerons, and I cut in mount-block notches after all the fuselage sections had been put together.

When all fuselage sections have been completed, sand the ends to make a good glue joint; be sure to glue them together so that the top longeron is straight, front to back. The fourth fuselage section has 1/16-inch balsa sheeting on its sides. Now is a good time to install all your doublers and landing-gear blocks and get the tail ready for whichever tailwheel bracket you want to use.

Drill the holes in the firewall before you glue it to the front of the fuselage structure. Once the firewall is in place, cut your 1/8-inch lite-ply cockpit deck and make the 1/4-inch brass straps to go across it. Solder blind nuts on the inside of these brass straps. I put 1/64-inch ply on the outside of the fuselage where the upper fuselage mount bolts go through. Now, clamp F1 down on the deck and behind the firewall and drill holes for the 1/4-inch dowels that hold the front of the deck.

WING

The wing is simple, and I built it using a jig to ensure a twist-free structure. First, I slid the ribs onto the two 1/4-inch-diameter steel bars in the correct sequence so that the lite-ply ribs (cabane and lift-strut attachments) ended up in their correct locations. Then I pressed the spars into the slots and clamped the sheeting into place over the LE and TE.

SPECIFICATIONS

Model: Pober Pixie

Type: sport-scale parasol

Length: 46.75 in.

Wingspan: 62 in.

Wing area: 645.5 sq. in. (4.48 sq. ft.)

Weight: 5 lb., 8 oz.

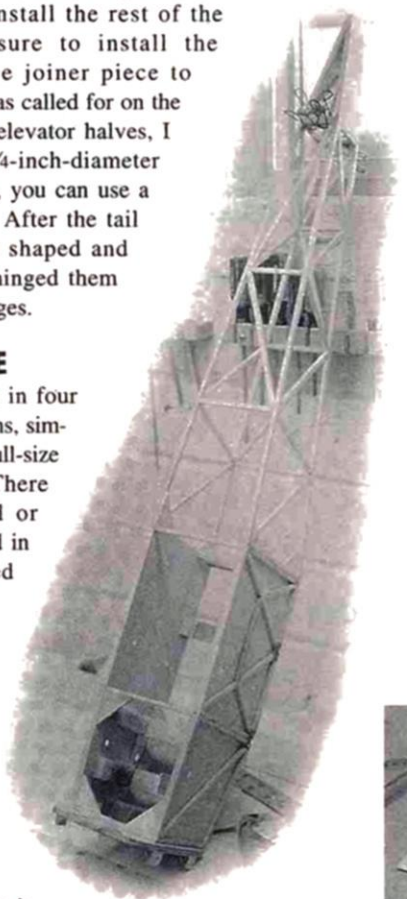
Wing loading: 17.85 oz./sq. ft.

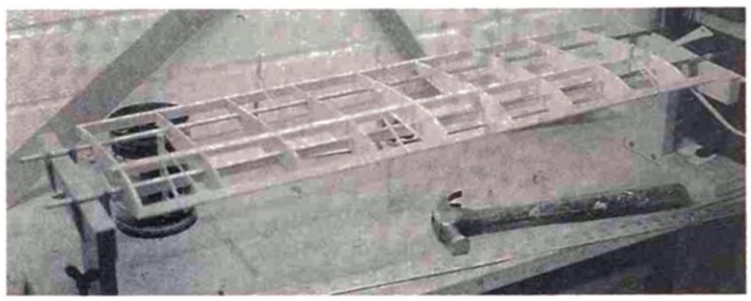
Engine used: O.S. .52

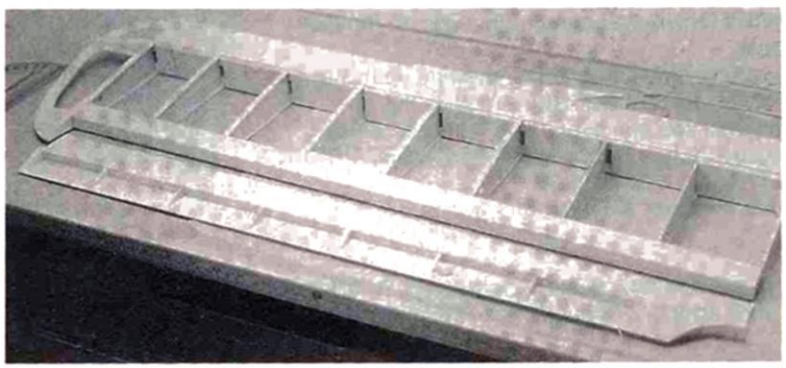
Channels req'd: 4 (elevator, rudder, aileron, throttle)

Control throws
Aileron: 5/8 up, 3/8 down
Elevator: 5/8 up, 1/2 down
Rudder: 1 inch each way

Comments: the Pober Pixie is a great flying, sport-scale parasol design of all-wood construction. The wing, cabane struts and removable cockpit area are all permanently attached to one another, and this arrangement gives both good appearance and unrestricted access to the inside of the fuselage.







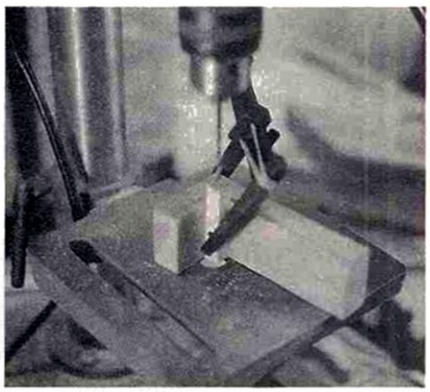
PHOTOS BY BOB TAYLOR

Above: the fuselage is made up of four separate sections that are glued together for the finished structure. Above right: the Pober's wing was built on a homemade jig. Two metal rods hold the ribs in alignment as the wing panel takes shape. Lower right: here's the finished wing panel and the aileron. Note the shear webbing on the main spar. The center ribs are not glued into position until the two wing panels have been joined.

Once I was sure that everything was properly aligned, I hit all the joints with Hot Stuff* glue. Do not glue the two center lite-ply ribs into place yet; they will be installed when the two panels are glued together to form the correct dihedral angle.

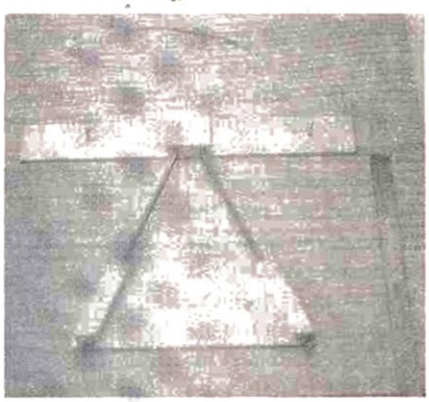
Once the wing panels had been assembled, I glued the cabane mount blocks and drilled them with an 1/8-inch drill bit, and then I cut and bent the cabane struts to shape. I used some scrap lite-ply and the cabane mount blocks to make a temporary jig to glue the blocks onto formers F2 and F3. This should be done very accurately to ensure that the wing ends up centered over the fuselage. Don't be scared; with a jig, it's easy.

Now, glue the cabane mount blocks onto the two center lite-ply ribs. The centerline of the wing should be 5 inches above the top of the cockpit deck. Bolt the deck down onto the fuselage and clamp the center wing ribs together. Slip the cabane struts into the F2 and F3 mount blocks and slip the wing into position. Check the alignment several times, and when everything looks good, use slow epoxy to glue formers F2 and F3 onto the cockpit deck. Sand the entire unit and plank it, if you wish. The rear turtle-deck portion of the body can now be installed, as can the 1/8-inch-square spruce side and bottom stringers.



Here, a cabane strut mount block is being drilled with an 1/8-inch drill bit. The blocks are made of laminated spruce and have a balsa center core. Since the balsa is softer than the surrounding spruce, it helps to guide the drill through the block's entire length.

The front cabane struts can now be attached to former F1 (see plans). Glue former F4 and the cockpit side rails into place, then install the lift-strut supports in the wing panels. When you drill the supports for the blind nuts, place the two



I made a jig to properly bend the cabane wires and to position the mount blocks on the fuselage former. The jig makes cabane construction and wing alignment much easier.

To order full-size plans (FSP10981), see Pilots' Mart, page 111.

FLIGHT PERFORMANCE

• Takeoff and landing

The Pixie has a long rear moment arm and wide wheel stance, so it taxies and handles well on the ground. It is a tail-dragger, so when the tail rises, it will need some right rudder, but that's normal.

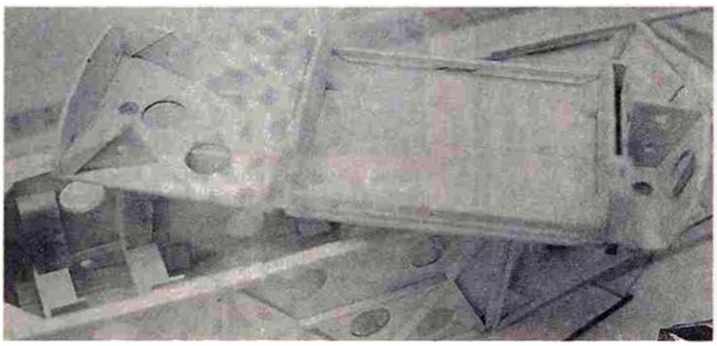
On landing, the model must be flown under a little power all the way to the runway. With a high degree of drag produced by the cabane and lift struts and a symmetrical airfoil, the Pober Pixie is definitely not a floater.

• Flight performance

The model flies much like the real Pixie, and I have many flights on it now. The model has plenty of power with an O.S. .52 4-stroke engine; you will enjoy its performance. With this engine, the model has a nice rate of climb but unlimited vertical, and it shouldn't! Throttled back, the model performs in a very scale manner and will make you quite happy. In general, the Pober Pixie is a very gentle flying plane.

• Aerobatics

As I said earlier, I changed the Pober's design by shortening the wingspan and giving it a symmetrical airfoil. When you want to, you can fly the model through many aerobatic maneuvers that I doubt the full-size Pober could perform. It spins nicely and rolls in either direction without a problem. Inverted flight needs a little down-elevator and some additional power. After many flights, the cabane struts/wing hold-down/top fuselage hatch design has proved very strong indeed.



The cockpit section of the fuselage is removable for access to the radio and fuel tank, and the entire structure and cabane struts are permanently attached to the wing.

panels back to back so the hole locations are identical.

Set both wings up with ½-inch dihedral measured under the outside ribs, and trim the spars to the correct length and angle. Sand and trim the leading and trailing edges at the same time. Now glue the no. 1 ribs in so the wing has the proper dihedral. Do not glue the wing halves together yet. Put one half back in the jig and set it up for planking. Be sure not to twist the wing out of alignment. Plank the bottom first, and drill through the cabane block into the bottom sheeting, and then install the top sheeting with yellow carpenters' glue. Cut and sand the TE to shape and glue on the TE planking. At this point, I put the wingtips on and made the ailerons. Repeat for the other panel; sand the wing halves and glue the two halves together. I left the center sheeting off so I could clamp the center together. Once the glue has dried, sheet the center section. Run a drill through the cabane strut holes and the top planking to make certain the holes are clear and the glue can go all the way through.

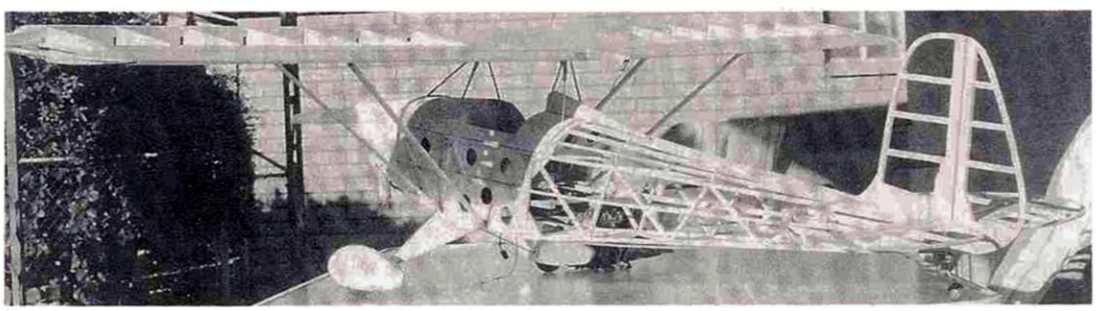
This is a good time to make your landing gear and the metal pieces that go in the end of your lift struts.

COVERING

Cover the bottom of the wing first, then the top of the cockpit section. If you want, you can cover and install the headrest now. Bolt the cockpit section onto the fuselage, then roughen the cabane strut wires with a coarse file, and "nick" the wire in several places so the glue can grip them securely. I used 30-minute epoxy to glue the cabane wires into the mount blocks. Slide the wing down into position and check its position with the incidence jig you made earlier. Attach the lift struts and check that everything lines up just right. Once the epoxy has cured, you can finish covering the rest of the model. As you can see on the plans, I did not install a dihedral brace in the wing. I used drywall fiberglass tape to strengthen the center section of the wing.

At the flying field, the Pober Pixie looks just like the real thing. Since it is a tail-dragger, you do need to be careful and use that rudder. The O.S. .52 supplies more than enough power. It is a gentle flying airplane and looks great on the wing. I hope you enjoy your Pober Pixie as much as I enjoy mine.

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.*



The completed model ready to cover. The Pober Pixie is different and has a high cute factor.

MODEL AIRPLANE NEWS
HOW TO

It's easy, inexpensive and environment friendly!

I NEEDED TO MAKE a thin cowl, and carving one out of balsa just wasn't practical. A modeler friend suggested that I pull one out of a clear plastic soda bottle. This sounded interesting, so I found a few clear bottles in the recycling bin and developed this simple, inexpensive procedure to make a very satisfactory cowl.

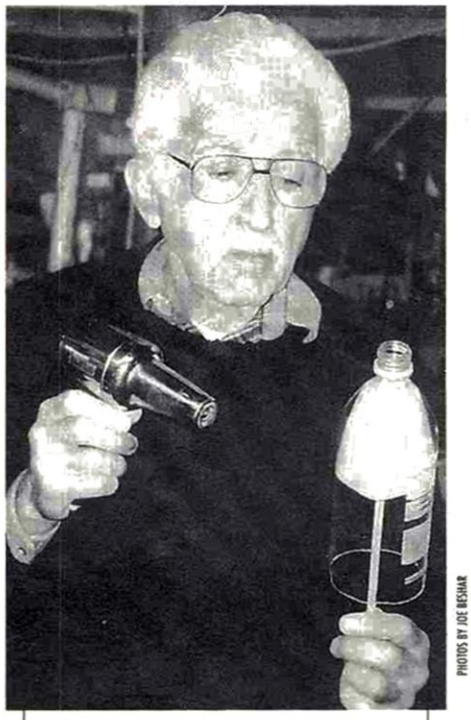
Make a Pop-Bottle Cowl

by JOE BESHAR

1 Make a plug of the cowl out of balsa, hardwood, plaster of Paris, etc.

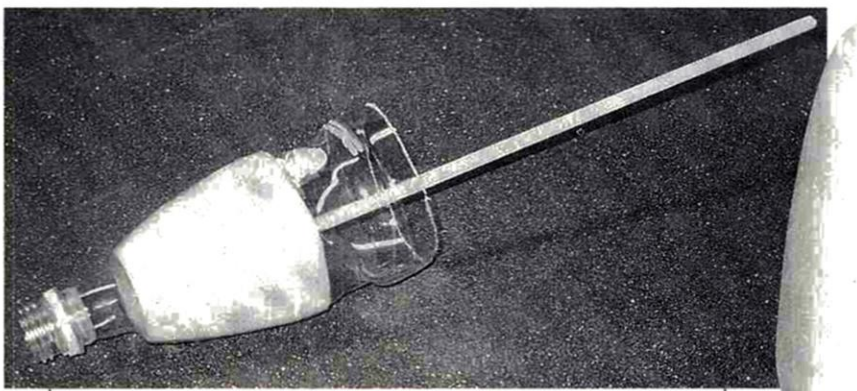
2 Use a clear plastic soda bottle into which the plug will fit as tightly as possible.

3 Cut off the bottom of the bottle and remove the cap. Insert a long dowel into the bottom of the plug.



4 Put the plug inside the bottle. Direct a heat gun at the bottle while you turn the assembly.

PHOTOS BY JOE BESHAR



5 The plastic has shrunk tightly against the mold plug. After it has cooled, trim the plastic and slide it off the mold.

6 Paint the inside of the cowl with plastic-friendly paint and, if you like, add a decal or two to the outside.

You can also use this procedure to make canopies and other model accessories out of plastic bottles. Good luck and happy landings!

SR *It's one thing to get people to read your ad... ...It's quite another to get them to write it!*

"Fascinating, informative, practical and helpful. I read every volume of Techniques several times and then keep them in a file. Thank you for the publication." David W., *"Good Stuff! Keep it going, could be the next "Grid Leaks" and that is one compliment cause "G-L" was fabulous."* Chet T., *"Saved me many mistakes. One of the only places that you get only the facts. No fluff!"* Bill M., *"I've been an RC'er since the 50's!!, but I find Techniques very helpful."* Lee K., *"Techniques is the best deal on information I've had in years!"* Ed L., *"Techniques is just great. I've already read each volume twice."* Bob W., *"I enjoy every issue. Very productive and useful. Keep up the good work!"* Bob P., *"One of he best things that has ever happened to R/C modeling. Keep it up!"* Bill D., *"I would like to thank you for a lot of good information that has been helpful and interesting. The volumes are great."* West F., *"The Techniques series is excellent! Excellent information. I've learned a lot from the series and the "tips" are great. Keep up the good work!!"* Chet B., *"This is a great service. I appreciate the effort and time you put into Techniques."* Pete P., *"I'm a novice and I appreciate that you're providing basics in understandable language."* Gary H., *"All I can say is that being new to R/C, it's great! Keep up the good work!"* Dwayne P.

Techniques is a different kind of publication. It's pure information without any of the "fluff." As you can see from the above comments, we must be doing something right!

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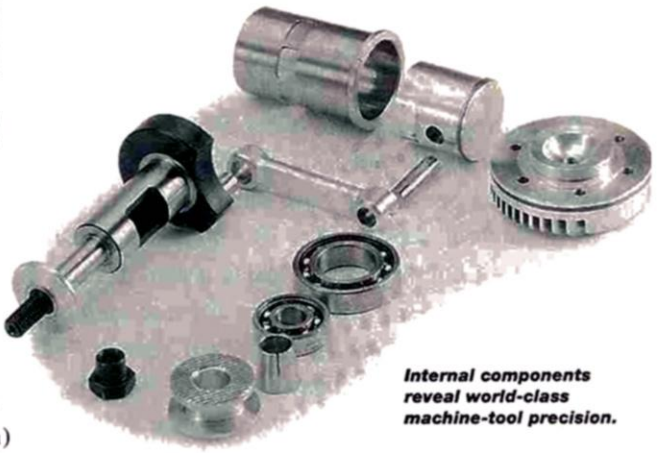
-ADVERTISEMENT-

by DAVE GIERKE

MOKI 1.20



Internal components reveal world-class machine-tool precision.

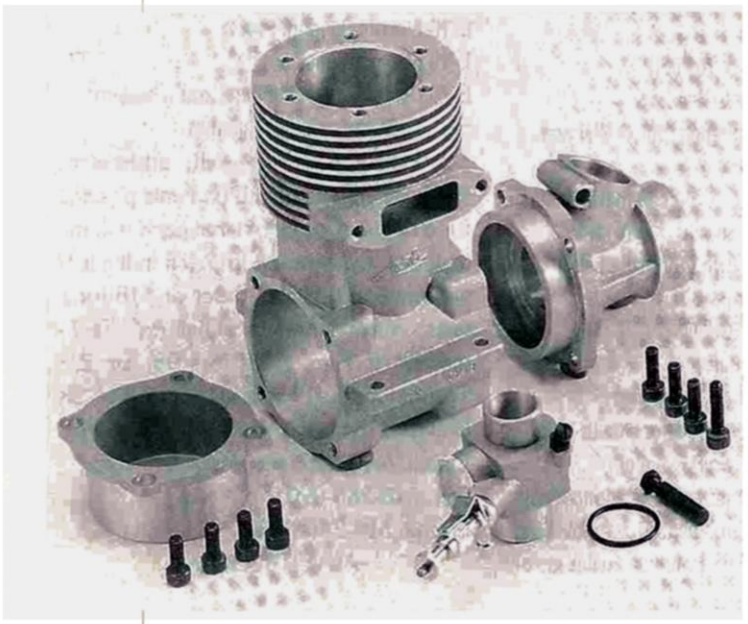
The Model-Line Ltd. Co. (formerly Modelta Ltd. Co.) of Budapest, Hungary, has been producing Moki 2-stroke model engines for more than four decades. During that period, most of these engines were directed to Hungarian competition modelers to use at domestic, European and world (FAI) competitions. Since the disintegration of the Soviet Union, Model-Line Ltd. has become a successful private firm in a free Hungary, expanding its model-engine market throughout the world. Gerard Enterprises* is the exclusive importer of Moki engines in North America.

There was a time when I thought a Fox .35 was a big engine; it easily flew my 3-pound control-line stunt model through all maneuvers. Later, the .61 (10cc) represented the ultimate in large engines; if you're smiling, you've never experienced hand-launching a snarling McCoy .60 mounted in a tiny control-line speed model.

I reluctantly accepted the .75, .90 and 1.20ci 4-strokes of the 1980s; they were big, heavy and didn't produce much power. They usually ran less than 10,000rpm, turned large propellers and were quiet compared to our 2-strokes—no threat here. That's what the technical committee for the FAI (international rules-making body for model aviation) must have thought when it legislated a 2 to 1 displacement advantage (1.2 to .61ci) for 4-stroke engines in most international competition events.

Big engine manufacturers licked their chops and plunged into decade-long R&D programs to upgrade the engine that already possessed a cylinder-displacement advantage. In automobile racing, there's an old saying, "You can't beat cubic inches." The adage has also been proven true for us. FAI competitors, who seldom overlook a loophole, immediately adapted to optimized 4-strokes. A few 2-stroke fanatics tried to compete but were overwhelmed by the 4-stroke's displacement-induced torque advantage.

Although there are mitigating factors, such as noise production, the 2-stroke engine is making a comeback. FAI has decided to level the playing field by lifting its displacement restraints on 2-strokes. As might be expected, the first enlarged 2-strokes haven't been doing so well against mature 4-stroke designs in FAI pattern competition; however, give experimenters a little time and things will probably change. A friend who flies competition pattern recently remarked, "I'm not against progress; it's the change that I hate!" This month's Moki 1.20 review shows how one manufacturer and innovative distributor is handling change.



The lost-wax casting process is used for the crankcase, front housing, rear cover and carburetor body.

ENGINE CONSTRUCTION

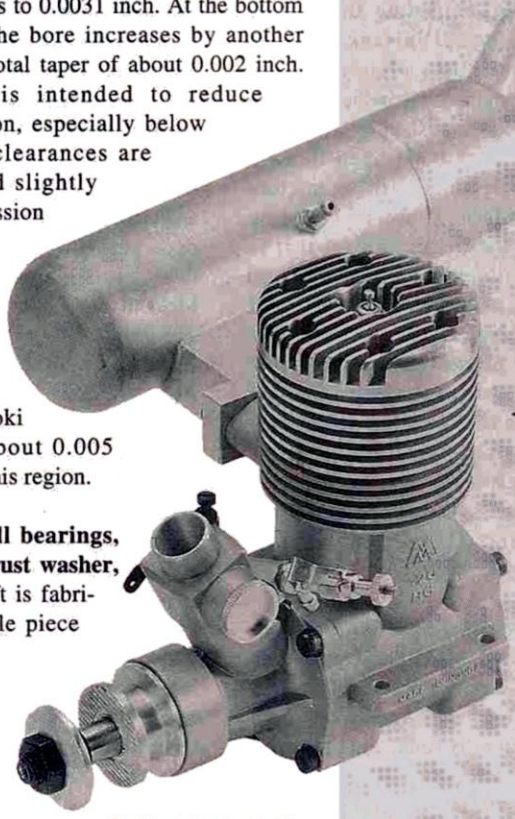
• **The castings—crankcase, front housing, rear cover and carburetor housing**—are produced by the investment-casting method (lost wax), which represents the finest and most expensive technique available to designers and manufacturers of precision miniature engines. All castings are vapor-blasted (glass bead) and then machined to final dimensions to provide a professional-looking contrast between finished surfaces.

• **Piston, wristpin and connecting rod.** Cast of aluminum alloy, the flat-top piston is fitted with a single cast-iron compression ring. The ring is prevented from rotating in its groove by a tiny, strategically located pin. The pin is press-fit into a radial-drilled hole located at the bottom of the ring groove. The inside portions of the ring ends are relieved slightly by grinding to clear the pin. In this position, the ring ends are located in a portion of the cylinder where ports don't exist as the piston travels from one limiting position to the other; this prevents the ring ends from migrating into a cylinder port, where they are certain to snag and cause rapid wear or breakage.

The hardened and ground steel wristpin is allowed to float in the piston (not a press-fit; 0.0002-inch

clearance) and is retained by two music-wire clips in conventional fashion. The connecting rod is machined from aluminum-alloy bar stock and is fitted with bronze bushings at both the crankpin and wristpin ends.

• **Cylinder.** The hard-chrome steel cylinder is machined for a light push-fit (drop-in) into the crankcase. Porting consists of two diametrically opposed Schnuerle transfers with an interposed boost port. The dual-window exhaust port is positioned directly opposite the boost and exits the side of the engine in standard form. Piston clearances are typical for a compression-ring engine of this size: total piston/skirt clearance at TDC, immediately below the ring, is 0.0022 inch. At BDC, this increases to 0.0031 inch. At the bottom of the cylinder, the bore increases by another 0.001 inch for a total taper of about 0.002 inch. Cylinder taper is intended to reduce piston/skirt friction, especially below the ports. Cold clearances are usually increased slightly above the compression ring, where piston expansion is greater due to its exposure to elevated combustion-gas temperatures. The Moki 1.20 measures about 0.005 inch clearance in this region.



Moki 1.20 2-stroke engine fitted with a Bisson sport muffler.

• **Crankshaft, ball bearings, front housing, thrust washer, etc.** The crankshaft is fabricated from a single piece of alloy steel. Afterward, it is case hardened and centerless ground to exacting journal and crankpin dimensions. The crankshaft, with its massive counterbalance, rides within two sturdy ball bearings that are installed with a moderate push-fit. The bearings are press-fit into the front housing with moderate force. The rear ball bearing is 20x37mm, and the front is 10x26mm.

The thrust washer is locked to the shaft by a truncated split cone (some call it a collet). The cone also clamps the inner race of the front ball bearing to the shoulder between the shaft's two journal diameters. The front ball bearing controls the crankshaft's axial position in the front housing. The front bearing is important for another reason: clearance between balls and races provides a bit of

SPECIFICATIONS

Cylinder displacement	1.205ci (20cc)
Bore	1.160 in./29.5mm
Stroke	1.140 in./29mm
Bore/stroke	1.018:1
Stroke/bore	0.982:1
Conrod length	2.082 in./52.9mm (center to center)
Conrod/stroke	1.826:1
Combustion-chamber volume @ TDC	1.98ml
Compression ratio	
—geometric	10.98:1
—effective	8.28:1
Carburetor bore	0.354 in./9.0mm
Crankshaft diameter (at the hub)	0.394 in./10mm
—at the threads	0.308 in./7.8mm
Crankshaft thread	8x1.25mm
Weight (bare)	30.1 oz./853.3gm
—w/muffler	Variable
Cylinder taper (TDC to sleeve bottom)	0.002 in.

PORT AND INDUCTION TIMING

Exhaust	
— opens	74° BBDC
—closes	74° ABDC
Total	148°
Transfer	
—opens	56° BBDC
—closes	56° ABDC
Total open	112°
Boost	
—opens	56° BBDC
—closes	56° ABDC
Total open	112°
Induction	
—opens	38° ABDC
—closes	58° ATDC
Total open	200°
Crankcase compression	66°
Exhaust blowdown	18°
Height (overall)	4.950 in./126mm
—from crankshaft centerline	3.980 in./101mm
Width (at lugs)	2.720 in./69mm
—at crankcase	2.000 in./5mm
Length (to prop driver)	4.560 in./116mm
—w/backplate mount	5.320 in./135mm
Mounting holes	
—beam, side to side	2.360 in./60mm
—front to back	1.380 in./35mm
—radial mount bolt pattern	3.350 in./85mm

PERFORMANCE

Maximum torque	295 @ 7,500rpm
Maximum B.hp	2.85 @ 9,800rpm
B.hp/ci	2.37
B.hp/lb.	1.53
Oz.-in./ci	246
Oz.-in./lb.	157
Maximum rpm (suggested)	12,000
Best rpm range	7,500 to 10,5000

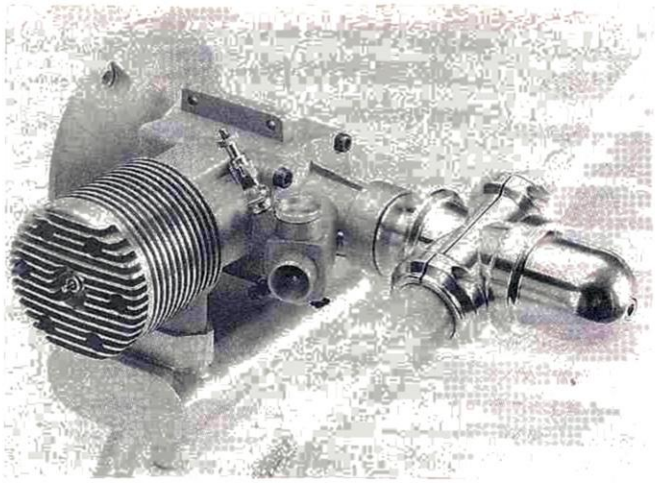
NOISE LEVEL

dBA	95.5 @ 8,750rpm (16x8 APC)
dBA	91 @ 7,100rpm (16x12 APC)
Muffler (test)	Bisson sport no. 01122
Fuel	5% nitromethane, 20% oil, 75% methanol
Sound meter	RadioShack no. 33-2050
Distance from engine	9 ft.
STREET PRICES	$275—Moki 1.20; $28—Moki 1.20 radial mount; $12—spinner nut adapter; Bisson custom mufflers—$45 to $55 ea.

Features: Schnuerle transfers with boost port and side exhaust; crankshaft front rotary-valve induction; chrome cylinder with single compression-ring piston; crankcase with removable front housing; twin ball-bearing-supported crankshaft; bronze-bushed connecting rod (both ends); one-piece squish-band-style head; and fuel-mixture compensating carburetor.

Hits
- Meticulously manufactured.
- High performance.
- Great instructions; best in the industry.

Misses
- Moki glow plug doesn't work with head-lock-type starter-battery adapters.



Here, the side-mounted Moki 1.20 is displayed with the radial-mount backplate and a Pitts-style Bisson custom muffler.

crankshaft end play (unloading); this is welcomed by most designers who wish to avoid binding (loading), as operational temperatures increase along with expansion. End play is usually between 0.002 to 0.004 inch when cold. Finally, the front ball bearing absorbs axial electric-starter forces and propeller thrust loads. So, what does the rear ball bearing do? It handles the substantial radial forces of the piston, wristpin and connecting rod.

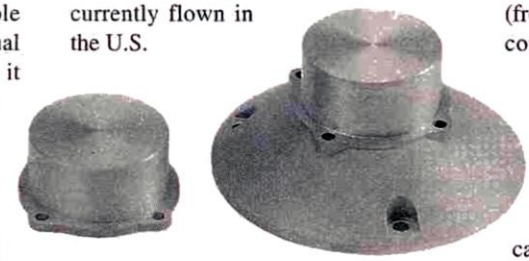
The clearance between the crankpin and the inside diameter of the bronze-bushed connecting rod is an ideal 0.002 inch.

A no. 60 hole has been drilled in the front housing between the rear of the front ball bearing and the front of the induction hole, just below the neck of the carburetor. Intersecting this hole is a shallow annular ring machined in the rear vertical surface of the bearing seat to provide a circumferential passageway for excess fuel. This tiny system is linked to the negative pressure of the crankcase, once per revolution, as the crankshaft's radial induction hole communicates with it, sucking residual fuel back into the engine. However, it isn't unusual for an engine to leak a drop of fuel every couple of seconds; this is how the front bearing is lubricated.

• **Cylinder head.** Turned and milled from aluminum-alloy bar stock, the head is held on to the upper crankcase by six, metric, Allen-head machine screws. It uses the squish band with single-bowl combustion-chamber design, which has proven to be popular with designers throughout the world.

• **Carburetor.** Operating similarly to the popular Perry/Varsane unit, the Moki carburetor uses a rotary barrel to throttle the engine's air induction. Fuel metering is accomplished by a primary needle valve for wide-open throttle operation. The idle/transition mixture control (rich/lean) is accomplished by an internal valve mechanism that is manipulated through a relatively large (⅝-inch-o.d.) aluminum disk arranged on the same side of the carburetor as the primary needle valve. By moving the disk clockwise (as viewed from its end), the idle/transition mixture is richened; counterclockwise, it's leaned—simple and effective. The needle valve is angled to the rear of the engine for safe operation. Carburetor bore is a conservative 0.354 inch.

• **Radial mount.** Replacing the standard rear cover, Moki provides a rear-cover/radial-mount combination as an accessory. This has become a very popular alternative to beam mounting for most model categories currently flown in the U.S.



The radial-mount backplate accessory is compared with the standard rear cover.

TECHNICAL DISCUSSION

With a cylinder bore of 1.160 inch (29.5mm) and a stroke of 1.140 inch (29mm), the stroke-to-bore ratio calculates to 0.982:1, which is slightly oversquare. The center-to-center connecting-rod length of 2.082 inches (52.9mm), when compared to the stroke, produces a conrod-to-stroke ratio of 1.826:1, which is slightly higher than average.

The exhaust port opens 74 degrees BBDC, with a total open period of 148 degrees of crankshaft rotation—about average for a non-piped, 2-stroke design of this type. The main transfers and boost ports open simultaneously at 56 degrees BBDC, with a total open period of 112 degrees. The blowdown period is 18 degrees of crankshaft rotation between exhaust-port opening and transfer-port opening. This exhaust lead is more than adequate to begin scavenging spent gases from the cylinder before the fresh air/fuel mixture begins to be transferred from the crankcase.

The crankshaft induction passageway is timed to open at 38 degrees ABDC and close at 58 degrees ATDC, for a total open period of 200 degrees. The relatively late closing of induction allows the Moki to attain only 66 degrees of effective crankcase compression before transfer-port opening ends the process. Although 66 degrees seems low when compared to other non-piped designs, the engine always displayed good crankcase scavenging and delivery ratio tendencies, as indicated by excellent torque output throughout its suggested operating range.

With the piston at TDC and the glow plug removed, the clearance volume (the chamber volume above the piston) was determined experimentally by filling it with Marvel Mystery Oil from a micro burette dispenser. The average of three trials produced 1.98ml; this translates to a geometric compression ratio (from BDC) of 10.98:1 and an effective compression ratio (from exhaust closure) of 8.28:1. These ratios were calculated with the head gasket in place and the factory-set head clearance of 0.020 inch. Recommended to operate on 5 percent nitromethane and 20 percent castor-oil fuel, the Moki's compression ratio appears to be ideal. In Europe, where operating without nitromethane is the norm, a slight compression-ratio increase probably wouldn't hurt. This is accomplished by removing the factory-installed head shim. However, a bit of nitro helps keep the glow plug hot

during idle and throttle-up operations and reduces the likelihood of flameouts and slow, sputtering acceleration.

ENGINE OPERATION

The engine was mounted on my all-aluminum, heavy-duty test stand for break-in. The recommended propeller, an APC* 16x8, was fastened securely to the engine's shaft after it had been accurately bored to size (drill press; letter X drill bit—0.397-inch diameter), balanced, and checked for tip runout. The Moki 1M.01 glow plug, which came with the engine, was chosen for break-in running. A Bisson* sport muffler (no. 01122) was selected for all bench tests because it didn't interfere with the geometry of the test stand. Some commercial fuels recommended by Gerard include: Byron Originals* Premium Sport 5 percent, Omega* 5 percent and K&B* 100+. As usual, I mixed my own fuel: 5 percent nitromethane, 20 percent castor oil and 75 percent methanol.

From the excellent instructions and break-in recommendations sheet: "Moki engines ... require a modest break-in period. The minimum time is 30 minutes, with best results at 1 hour or more. Make sure that you do not run the engine with a lean mixture for the first 20 to 30 minutes. In fact, it is best to run your engine as rich as possible, without it stopping, during the first 15 to 30 minutes. This would be at a speed of approximately 7,000rpm with the 16x8 propeller. After that, you can lean it out for short periods of time. When the engine will hold a (peak rpm) setting without slowing, it can be considered broken in .... Never attempt to accumulate all of the break-in time in one run. It is always best to run the engine in short runs of 2 to 3 minutes and let it cool down before starting again. Do not run at low throttle settings during break-in. Run the engine at full throttle and slow it down by increasing the fuel mixture (richness). Take your time, do it right, and you will have an engine that will last a very long time."

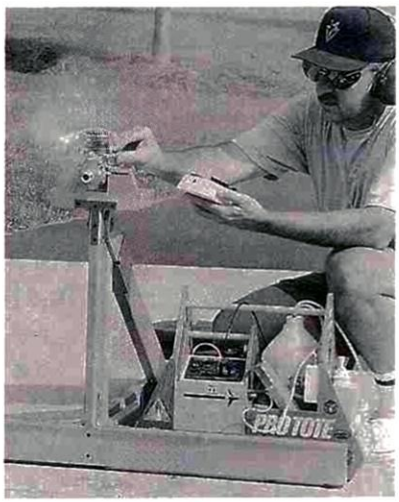
Opinions concerning engine break-in are a dime a dozen, including whether it's necessary at all. Nevertheless, I printed Gerard's entire statement because I agree with it 100 percent. However, be aware that these guidelines pertain only to ringed engines and some lapped-piston units—those with iron or steel pistons and cylinders. As I've mentioned many times in the past, the other major category—ABC-type engines—must be broken in and operated much differently to achieve maximum power and longevity.

According to instructions, the primary needle valve was set at 5 turns open from its closed position. Choke the engine for three revolutions of the propeller. Flip the prop three more times, without the choke, using a Davis Model Products* Starter Stick. Close the throttle to about ¼. Connect the starting battery. I decided to hand-start the Moki using the clockwise back flip of the propeller off compression. As the engine fires, it kicks back in the desired direction (counterclockwise) and starts. An electric starter could be used, but mine didn't have the torque to spin the 1.20. No matter. The Moki hand-starts so easily that you soon forget about starters; only one or two flips were usually required.

The hexagonal base of the Moki glow plug isn't machined to work with American-style starter-battery adapters; they don't grip. Without this locking action, the plug adapter must be held in place by hand. I wish that manufacturers of glow plugs would standardize their designs and eliminate this aggravating and potentially dangerous problem. Speaking of danger, don't forget to paint the tips of your propellers a bright color before you use them. Yellow works well for me.

Following the procedures detailed above, I ran the engine three minutes at a time for one hour. At the end of that period, the Moki held a fairly steady peaked 2-cycle operation. I'm sure that the engine will further improve with additional running time. The decibel reading using the 16x8 propeller was 95.5 at 9 feet (8,750rpm). With a 16x12 APC installed, the noise level dropped to a more acceptable 91dBA (7,100rpm), which represents more than a 50 percent reduction in sound intensity. With minor adjustments to the idle disk, I obtained a tick-over idle of 2,000rpm, coupled with a crisp acceleration to wide-open throttle—very impressive.

All of these Bisson custom mufflers were designed specifically for the Moki 1.20 engine.



Your faithful "RPM" columnist sets the needle valve during engine break-in. Notice the safety precautions: body positioned behind the engine; eye and ear protection; holding the tachometer behind the propeller.

RPM WITH SELECTED PROPELLERS	
15x6	10,500
15x8	9,500
14.4x10.5	9,200
16x8	8,750
15x10	8,600
15x12	7,900
16x12	7,100
18x8	7,000

COMMENTS

All aspects of the Moki 1.20 engine are outstanding: design, manufacturing, performance, longevity and support software. Compared with other engines in the category, it's more expensive; however, excellence has always cost more. The big Moki 1.20 is the most highly refined, precision-built 2-stroke engine that you can buy.

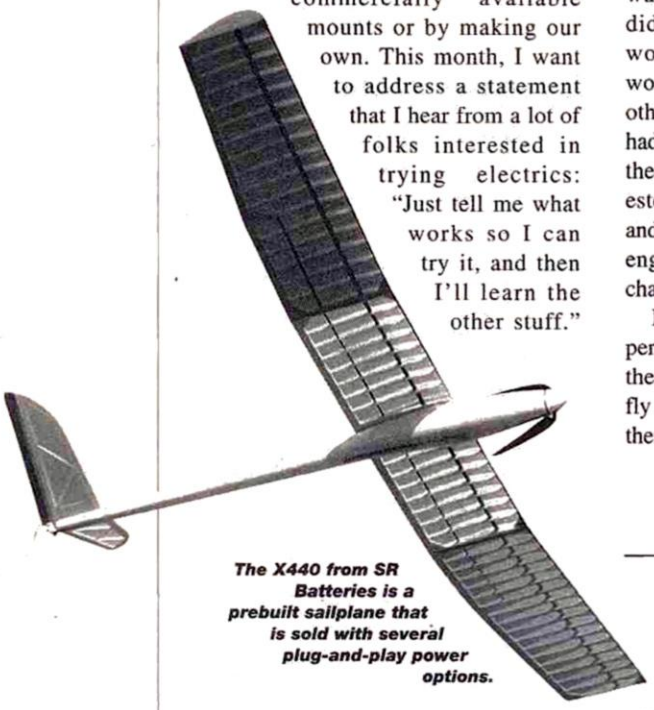
**Addresses are listed alphabetically in the Index of Manufacturers on page 126.* ✚

Current THOUGHTS

by GREG GIMLICK

FIELD NOTES: SETUPS THAT REALLY WORK

IN MY LAST two columns (June and August '98), we looked at ways to mount motors by using commercially available mounts or by making our own. This month, I want to address a statement that I hear from a lot of folks interested in trying electrics: "Just tell me what works so I can try it, and then I'll learn the other stuff."



The X440 from SR Batteries is a prebuilt sailplane that is sold with several plug-and-play power options.

This request may at first take some of us aback, but when I think about it, didn't most of us learn to fly R/C this way? I was told what to get, and I didn't have a clue how the engine worked or why these components would work together, but I had seen other folks use the same setup and it had worked. Why shouldn't we provide the same opportunity to people interested in electrics? With that in mind and with apologies to budding electrical engineers, I'm offering the following charts.

Now, here's the disclaimer: I can personally vouch for all the planes in these charts. I have seen these setups fly and am comfortable recommending them. I know there are other variations of some of these kits, and I've seen photos of others not listed here, but if I didn't have personal knowledge of them or I have lost my notes on them, I left them out. Many websites list setups that reportedly fly well, but I don't know all the people who submit them, and since opinions vary on what is an acceptable level of performance, I left them out. Admittedly, this is a subjective judgment, but I want a plane to ROG if it's supposed to, and I want to be able to do a loop without having to dive at terminal velocity before I begin. With that in mind, some setups use "can" motors that met my minimum requirements but aren't necessarily what I'd recommend; these are noted.

THE CHARTS

Chart 1 shows easily available kits that have been converted to electric power. A range of weights for a particular model simply means it has been successful throughout that range. The Kadet Senior is a good example and one of the easiest kits to convert, as it has lots of wing to handle the range of possible setups. Some folks have taken a lot of the original plywood out and replaced it with balsa, but each kit listed can be successful with little or no wood substitution.

HIGH-WING TRAINERS

AIRPLANE NAME	SPAN (IN.)	AREA (SQ. IN.)	WEIGHT	MOTOR	PROP	CELLS
SIG SENIORITA	63	746	5 to 6 lb.	Astro 25G	12x8	16x1700
				Astro 15G	12x8	14x1700
SIG KADET SENIOR	78	1150	7 to 10 lb.	Astro 40G	13x8	21x1700
				Astro 40G	14x6-10	18x1700
				MaxCim 15-13Y 3:1	13x8	18x1700
				Aveox 1409/2Y 3.7:1 Modelair-Tech	12x10	16x1700
				Dewalt 14.4V/H1000 3.6:1	15x8	21x2000
TELEMASTER 40	73	848	7 lb.	MaxCim15-13Y 3.16:1	13x8	18x1700
HANGAR 9 EASY FLY 40 ARF	64	704	6 to 7 lb.	Astro 15G	12x8	14x1700
				Astro 25G	13x8	14x1700
				Astro 40G	13x8	18x1700
				MaxCim 15-13Y 3:1	13x8	18x1700
				Aveox 1412/3Y direct	10x6	12x1700
CARL GOLDBERG MODELS FREEDOM 20	56	440	79 oz.	Astro 15G	11x10	12x1700

Chart 2 comprises mid- and low-wing sport models for more experienced pilots. Once again, they are conversions, and because the builder's experience is usually above that of the novice builder/pilot, you can be a bit more creative when making necessary changes. I don't make blanket recommendations such as "Remove all the plywood," but keep in mind that you won't be dealing with engine vibration and fuel soaking, so you won't necessarily need all that beefy construction. Keep in mind that the battery-pack weight will need to be supported when you adapt a kit.

Dave Grife modified (lightened) a Midwest Extra 300; he powered it with a geared AstroFlight 60 that draws power from 36-2000mAh cells.

MID- AND LOW-WING SPORT PLANES

AIRPLANE NAME	SPAN (IN.)	AREA (SQ. IN.)	WEIGHT	MOTOR	PROP	CELLS
SIG ASTRO HOG	71	824	8 lb.	Astro 40G	13x8	18x1700
				Astro 40G	13x10	21x1800
SIG FOUR-STAR 40	60	604	6 to 7 lb.	Astro 25G	12x8	16x1700
				Astro 40G	13x8	18x1700
				Astro 40G	13x10	21x1700
				MaxCim 15-13/Y 3:1	13x8	18x1700
ACE CLOUD DANCER 40	60	500	5 to 7 lb.	Astro 25G	12x8	16x1700
				Astro 40G	13x10	18x1700
ACE CLOUD DANCER 60	72	840	7.5 lb.	Astro 40G	13x8	21x1700
ACE SEAMASTER 40	59.5	725	8.5 lb.	MaxCim 15-13Y 3.5:1	13x8	20x1700
GREAT PLANES ULTIMATE BIPE	43	742	8 lb.	MaxCim 15-13Y 3.2:1	12x8	20x1700
CARL GOLDBERG MODELS ULTIMATE BIPE	54	980	8 lb.	Astro 40G	13x8	21x1700
SIG WONDER	38	338	38 to 48 oz.	Astro 15 direct	8x6	10x1700
				Astro FAI 05 direct	8x4	7x1000
				Aveox 1409/2Y direct	9x7	10x1000

The Robbe BA-146 is a popular entry among electric jets. It is powered by four Speed 400 motors that sip power from 7 or 8 cells.

Chart 3 shows some scale planes that have been successfully converted, many of which had little or no alteration other than a change in power systems. The Bristol M1 and the Hangar 9 J-3 Cub are a couple of those, while others like the Corsair had considerable work done to replace heavier wood. One of the interesting things I found when I was going through my notes was that electrics fliers do a lot more scratch building than I realized. I attribute this to the clean and vibration-free power systems that allow many otherwise unsuitable plans to be attempted. As you can see, Cubs are good conversions, so that may be a good starting point for you if you want a scale electric.

SCALE PLANES

AIRPLANE NAME	SPAN (IN.)	AREA (SQ. IN.)	WEIGHT	MOTOR	PROP	CELLS
SIG 1/6-SCALE CUB	71	700	5 to 6.5 lb.	Astro 15G	12x8	14x1700
				Astro 25G	12x8	16x1700
SIG 1/4-SCALE CUB	105	1600	18 lb.	Modelair-Tech H1000DP Dewalt 14.4 Combo 3.6:1	18x10	32x2000
BALSA USA 1/4-SCALE CUB	108	1600	14 lb.	Modelair-Tech Dewalt Dual 14.4 Combo 3:1	18x6	28x1700
NOSEN 1/4-SCALE CUB	105	1900	16 lb.	Modelair-Tech H1000DP 12V Speed 700 3:1	20x11	32x1500
HANGAR 9 CUB ARF	80	960	9 to 10 lb.	Astro 40G	13x8	21x1800
				MaxCim 15-13Y 3:1	13x8	18x1700
				MaxCim 15-13Y 3.3:1	14x8	20x2000
				Aveox 1415/2Y 3.7:1	15x6	22x1700
GREAT PLANES CUB 40	76	750	6.5 lb.	Astro 25G	12x8	16x1700
GREAT PLANES CUB 60	83	1100	8.5 lb.	Astro 40G	13x8	21x1700
HOUSE OF BALSA EXTRA 300	56	550	6 lb.	Astro FAI 40 direct	10x6	16x1700
GREAT PLANES EXTRA 300S	58	594	6.5 lb.	MaxCim 15-13Y 3.3:1	14x8	20x1700
CONCEPT MODELS FLEET BIPE 1/6	56	890	6 to 7 lb.	Astro 40G	13x8	20x1500
				MaxCim 15-13Y 3.53:1	14x6	20x1800
MIDWEST 1/5-SCALE CITABRIA	81	970	9.5 lb.	Astro 40G	13x8	21x1700
GREAT PLANES F4U CORSAIR	56	573	7 lb.	Astro 25G	11x7	16x1700
BALSA USA BRISTOL M1	60	650	7 lb.	MaxCim 15-13Y 3.7:1	14x8	20x1700

Jim Ryan shows off his Hellcat and P-38; both kits are available from Ryan Aircraft.

Here's a Dynaflite Corsair that has been converted to electric power. It sports an Astro 25G and 16 cells.

Chart 4 shows kits that are readily available and designed to be electric. Of particular note is the AstroFlight Porterfield Collegiate, which is now being kitted by Spirit of Yesteryear. This has always been a beautiful airplane, but one that had a reputation for being a lot of work to build. With the new laser cutting and balsa selection by the folks at Spirit of Yesteryear, that is no longer the case. This kit is beautiful, as are the others they've obtained the rights to, so ignore the old rumors and give Spirit of Yesteryear a shout for details.

You'll also notice that multi-engine planes are represented. You'll see more multis at electric meets than glow meets because electric power makes multis easier, and the cheaper Speed 400 motors work extremely well. At the same time, some of these small twins can have pretty hefty wing loadings, so be sure your skills are up to the task. A twin will also require that you learn how to wire motors in parallel and series, but don't fear, we'll talk about that soon; there's nothing to it.

KITS DESIGNED FOR ELECTRIC POWER

AIRPLANE NAME	SPAN (IN.)	AREA (SQ. IN.)	WEIGHT	MOTOR	PROP	CELLS
CARL GOLDBERG MODELS MIRAGE 550	48	440	48 to 55 oz.	Can 05*	8x4	7x1700
				Astro 05 direct	7x6	7x1700
				Astro 15 direct	8x4	10x1700
GREAT PLANES PT ELECTRIC	56	500	3 to 4 lb.	Can 05*	7x6	7x1700
				Astro 05 direct	7x6	7x1700
				Astro 05G	11x7	7x1700
GREAT PLANES ELECTRICUB	59	480	3 to 4 lb.	Can 05*	7x6	7x1700
				Astro 05 direct	7x6	7x1700
				Astro 15G	11x7	10x1700
CLANCY AVIATION LAZY BEE	40 or 48	526/638	3 lb.	Can 05*	7x6	7x1700
				Astro 05G	11x7	7x1700
ACE TIGER KITTEN	60	550	4 to 5 lb.	MEC Turbo 10+ 6:1	12x8	10x1700
				MaxCim 15-13D 3:1	11x7	10x1700
				Astro 15G	12x8	12x1700
AEROCRAFT APACHE	44	340	50 oz.	Aveox 1406/3Y direct	9x6	7x1700
MEC/SURE FLITE P-51 & ZERO	40	550	4 lb.	MEC Turbo 10+ 6:1	13x7	10x1700
GREAT PLANES ELECTROSTREAK	44	340	42 to 55 oz.	Can 05*	7x6	7x1700
				Astro FAI 05 direct	7x6	7x1700
				Astro 15 direct	8x6	10x1700
				SR Max-7 direct	7x6	7x1700
				Aveox 1406/4Y direct	8x5	10x1700
MIDWEST ELECTRIC HOTS	41	372	45 to 52 oz.	Astro FAI 05 direct	7x6	7x1700
				Astro 15 direct	8x6	10x1700
				MEC Turbo 10+ 6:1	12x10	10x1700
ASTROFLIGHT PORTERFIELD	69	690	6 to 7 lb.	Astro 25G	13x8	14x1700
				Astro 25G	12x8	16x1700
STREAM R/C SCHNEIDER SPORT 60	63	667	6 lb.	Astro 25G	12x8	16x1400
			8 lb. on floats	MaxCim 15-13Y 3:1	13x8	16x1800
RYAN AIRCRAFT HELLCAT	30	168	18 oz.	Speed 400 6V	6x4	8x600
RYAN AIRCRAFT P-38	48.5	334	40 oz.	Speed 400 7.2V	6x4	16x600
MODEL DESIGNS SEA FURY	47		54 oz.	Astro 05 direct	8x4	8x1700
HOBBY LOBBY DONALD SEAPLANE	55	428	55 oz.	Speed 600 8.4V	8x4	8x1700
HOBBY LOBBY P-38	48	324	48 oz.	Speed 400 6V	5x5	8x1700
HOBBY LOBBY B-25	53	510	50 oz.	Speed 400 6V 2.33:1	9x6	8x1700

*These motor setups just barely met my minimum requirements. The other motors listed were more than adequate, and I would recommend using any of them.

Chart 5 is for pylon racing and practicing. A plane like the MiniStreak could be listed as a sport plane since it isn't specifically designed for racing, but it makes a great pylon trainer, so I've included it here. Speed 400 pylon racing is growing rapidly and is a lot of fun for the buck, so be sure to consider these if you like to go fast and turn left.

KITS DESIGNED FOR ELECTRIC PYLON RACING

AIRPLANE NAME	SPAN (IN.)	AREA (SQ. IN.)	WEIGHT	MOTOR	PROP	CELLS
GRAUPNER MINI-VIPER	30	130	17 oz.	Speed 400 6V	CAM 5x5	7x500
McDONOUGH MINISTREAK	30.5	150	18 oz.	Speed 400 6V	6x4	7x600
MODELAIR-TECH BARE BONES	30	160	16 oz.	Speed 400 6V	6x4	7x500
MODELAIR-TECH SSP-400	36	180	16 oz.	Speed 400 6V	5x5	7x500
RAPTOR AEROSPORTS FALCONET	32	140	17 oz.	Speed 400 6V	5x5	7x500
CSD SWITCHBLADE	29	121	16 oz.	Speed 400 6V	5x5	7x500
DIVERSITY MODEL PRODUCTS SKAT	30	100	14 oz.	Speed 400 6V	5x5	7x500

Chart 6 is made up of sailplanes, including a few F5B types. If you're serious about trying an F5B plane or one of the limited-motor-run high-performance planes, I strongly suggest you ask the folks at Aveox or New Creations for advice. These setups can draw 85 amps and are nicknamed "flying welders"; although they are extremely impressive, they can be very dangerous if set up incorrectly. The rest of the chart covers a range of flying abilities, from docile 2-meter polyhedral ARFs to more sophisticated composite planes.

SAILPLANE TYPES, INCLUDING F5B

AIRPLANE NAME	SPAN (IN.)	AREA (SQ. IN.)	WEIGHT	MOTOR	PROP	CELLS
GREAT PLANES SPECTRA	78	676	50 to 60 oz.	Goldfire Can 550 direct	8x4	7x1700
				Goldfire Can 550 3:1	13x7	8x1700
				Astro 05G	12x8	7x1700
				SR Max-7	8x4	7x1700
CARL GOLDBERG MODELS ELECTRA	78	663	48 to 52 oz.	Can 550 direct	8x4	7x1700
				Astro 05G	12x8	7x1700
HOBBY LOBBY TIMOTHY 400	59	400	25 to 30 oz.	Speed 400 6V	6x3	7x600
				Speed 400 6V	6x3	7x1200
				Speed 400 7.2V	6x3	7x1700
HOBBY LOBBY SKIMMER	70	532	48 oz.	Speed 600	8x4	7x1700
				Astro 05 direct	8x4	7x1700
				SR Max-7	8x4	7x1700
HOBBY LOBBY SKIMMER 400	59	342	28 oz.	Speed 400 6V	6x3	7x600
CERMARK EASY ELECTRO-72 ARF	72	522	60 oz.	Can 550 direct	8x4	7x1700
TOWER EP 2-METER ARF	78.5	591	55 oz.	Can 550-SH	10x6	7x1700
NEW CREATIONS MILLENNIUM FALCON	80	650	50 to 64 oz.	Astro FAI 05G	12x7	7x1700
				Astro FAI 05G	14x7	7x1700
				Aveox 1412/2Y	12x7	10x1700
				Aveox F7LMR	14x10	7x1700
GREAT PLANES SPIRIT 2-METER	78.5	676	65 oz.	MaxCim 15-13D 3:1	14x8.5	10x1700
SIG RISER	78	620	55 oz.	Leisure 28T 3.8:1	13x8	7x1700
HOBBY LOBBY JERRY	83	510	78 oz.	Mega FAI 10SP	13x7	10x1000
ROBBE LIMIT	67	494	80 oz.	Aveox F27 3.8:1	15x13	27x1000
SANYO LIMIT	68	450	58 oz.	Aveox 1412/2Y	11x7	10x1000

The Hobby Lobby Timothy comes almost ready to fly and is a fun, small-field flier.

This information should be more than enough to get started—or at least, to raise some questions. The vendors listed are knowledgeable about electrics and don't want to sell you the wrong equipment, so don't hesitate to ask questions when you call. As always, I would love to see pictures and videos of what you're building and how it flies, so keep "Current Thoughts" in mind when you produce that masterpiece. You can contact me at greggimlick@mindspring.com.

The addresses of the manufacturers mentioned in this column are listed alphabetically in the index on page 126.

by GEORGE LEU

MAXIMIZE YOUR FLIGHT SCORES

As you read this, we should be in the heart of flying season. While I attend many scale meets and am impressed with the flying skills shown by the flyers I meet, I am surprised at how often some maneuvers are performed improperly. I am not referring to "hot dog" maneuvers but, rather, scale-like or prototypical flight maneuvers. If you check the AMA rule book, many well-explained maneuvers are shown. At most scale events, five maneuvers are mandatory and five are optional. This allows great flexibility for the scale competitor, and it gives him the opportunity to best present his model to the flight judges.

Takeoffs and landings are two of the mandatory maneuvers that are not complex but are often improperly done. A good takeoff is done with a smooth and gradual increase of the throttle. Abrupt application of throttle followed by rocket-like departures are reasons to be downgraded. Scale aircraft should "rotate" to the takeoff attitude prior to liftoff. Once rotation is achieved, a slight application of up-elevator and a slight increase in power are all that are necessary for a good liftoff. "Horsing" the model off the ground before rotation and adequate airspeed have been reached usually results in a snap roll to the left and an appropriate downgrading for the maneuver.

Good landings and maximum points are achieved when the airplane is flown to the runway under power. You need to set up a constant rate of descent using throttle to control the sink rate. When the airplane is about 1 or 2 feet above the ground, reduce power to idle and then pull back on the elevator slightly to flare the airplane for a soft landing. Always relax and enjoy flying your airplane. Never rush your landing unless you have a dead-stick situation.

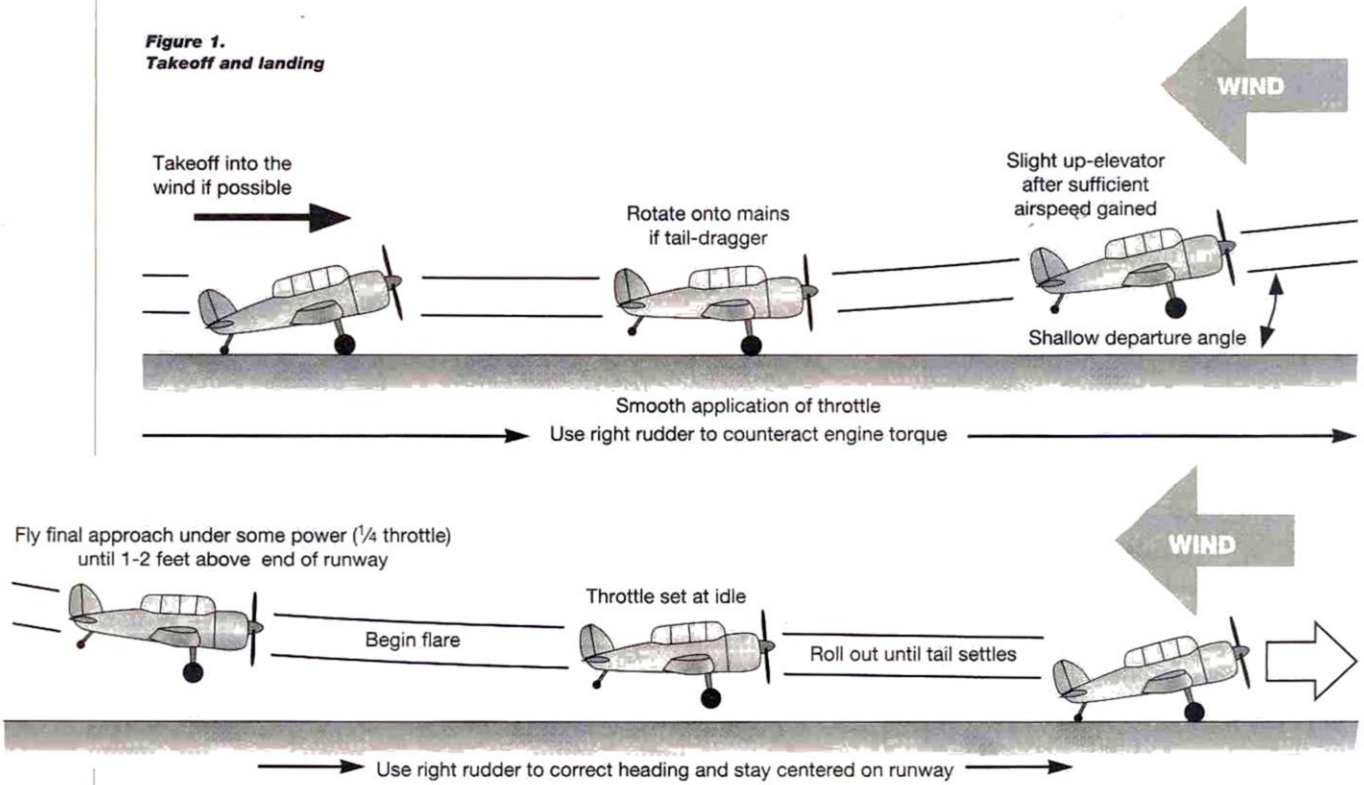
One of the reasons I enjoy scale judging so much is that I learn many things by watching my peers. As a flight judge, I've noticed that the biggest reason for a downgrade during takeoff and landing is excessive rate of ascent or descent (see Figure 1). Real airplanes fly smoothly, so gradual rates of ascent or descent ensure better flight scores. Try to pretend that you are in the airplane. That should help make you fly more smoothly.

THE FIGURE-8

The figure-8 continues to be my favorite optional maneuver. Keeping the altitude constant and the crossover points in the middle, and making the left and right halves identical in size are harder than they look. The best way to practice this maneuver is with a helper who can point out your weaknesses. Then you need to practice, practice and practice some more.

Start the figure-8 maneuver into the wind and recognize the effect the wind has on the right and left halves. The upwind circle needs some compensation to stretch the maneuver, while the downwind circle needs to be shortened up some to keep the two halves relatively the same size. Throttle use is also necessary during the maneuver to give the judges the impression of symmetry. When your aircraft is flying into the wind, throttle needs to be increased, and it needs to be decreased when heading downwind (see Figure 2).

Figure 1.
Takeoff and landing



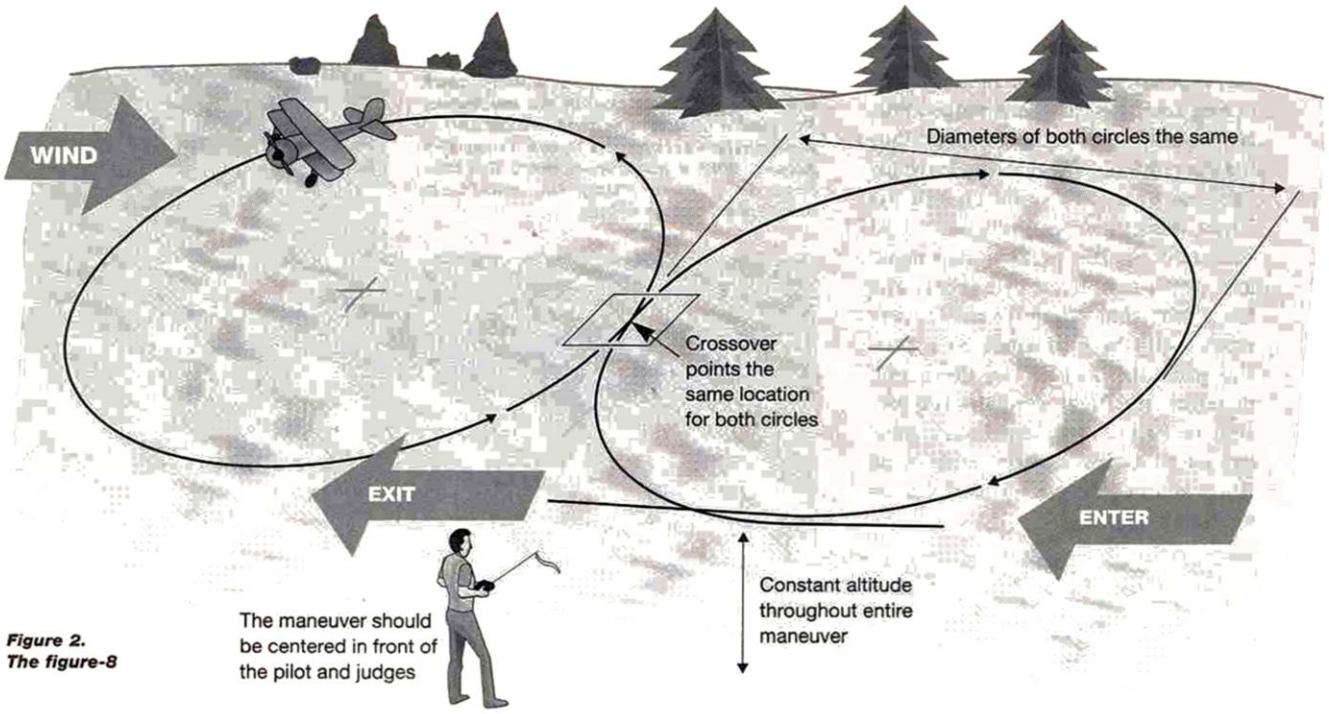
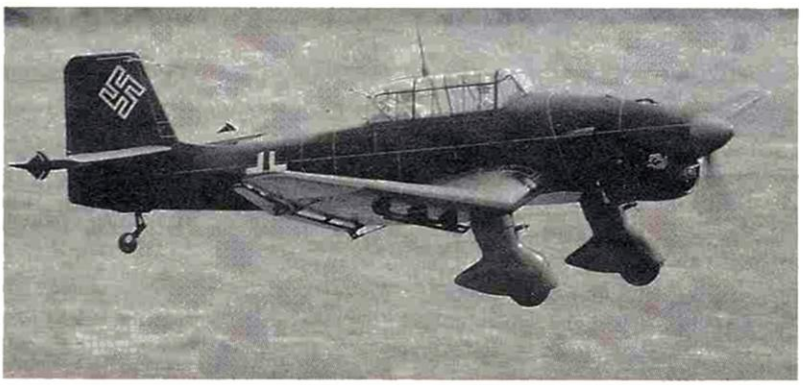


Figure 2. The figure-8

THE FLYBY

The flyby and "realism in flight" go hand in hand with the subject you are flying. A jet or WW II fighter should be flown fast, smooth and low during the flyby maneuver. A lightplane or Golden Age aircraft requires a slower flyby. WW I aeroplanes don't fly fast, so you should present them closer to the flight judges and at a slightly higher altitude. From a safety perspective, all aerobatic aircraft should be flown at the far edge of the runway and not close to the flightline.

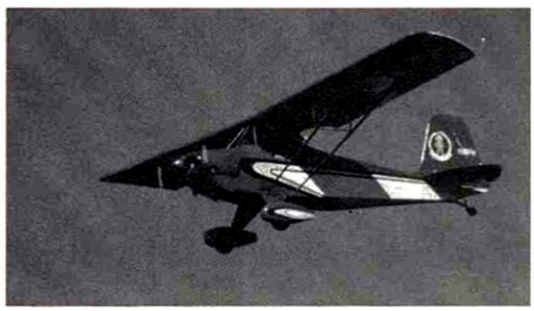
The flyby maneuver is also a good opportunity for WW I flyers to earn realism in flight points. To do this, simply increase and decrease (blip) the throttle during your flyby. This produces the scale effect of a WW I aeroplane that has a magneto switch for throttle control flying by. WW I pilots had to turn their ignition switches on and off to regulate their rpm, since they did not have throttle control. Of course, you must also maintain straight and level flight during the maneuver to maximize your score.



A warbird such as this Ziroli Stuka should be flown fast and low and a bit out past the centerline to gain flight realism points. Remember, safety first; flying a big, fast warbird too close to the judges will earn you a downgrade.

At Top Gun and some other scale events there are different flight-maneuver requirements. For example, Top Gun requires both a fast and a slow flyby as part of its mandatory maneuvers. Judges look for significant flight-speed differences between the fast and slow flybys. Slow flybys then, are done with flaps and retracts deployed, and the high-speed pass is executed with flaps and landing gear retracted.

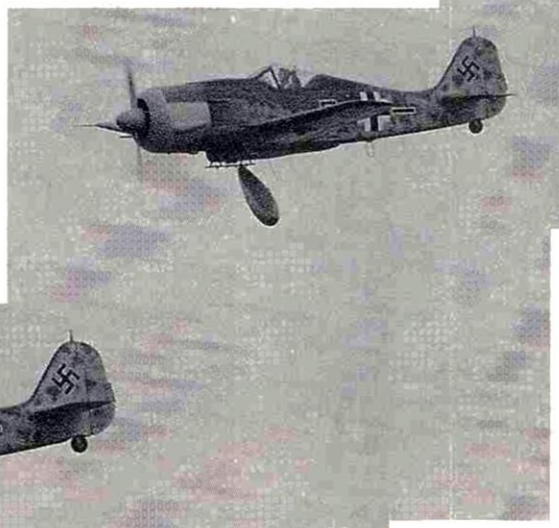
Realism scoring is a reflection of all the maneuvers performed (both optional and mandatory). Points are given as part of every maneuver score—not as a separate score. Smoothness, constant elevation, types of turns, airspeed, etc., are all taken into account. Retractable gear that slam up and down as well as other abrupt mechanical options can affect the realism score. An Eindecker flying inverted would be totally unrealistic and would downgrade your flight score. You get the idea; you need to fly the maneuvers typical of the subject aircraft, and if you have mechanical options, make sure that they are used realistically.



If you fly a lightly loaded model like this 1/3-scale Pober Pixie built by Canadian Jean Chevalier, you must fly it in a prototypical (read: slow) fashion. Light aircraft are best flown slightly higher and a bit closer than normal to the judges for maximum flight points.

I remember an incident long ago, when one of my fellow competitors felt that his retractable landing gear option score had not been judged fairly. So instead of pouting around during the contest, he decided to leave his landing gear down and switch his flight maneuvers to proto-taxi, FAI overshoot, traffic pattern, flap demo and proto-taxi back to hangar. His logic was that all those maneuvers would only be performed by a full-size plane that had its gear down and, therefore, the flight would be 100 percent realistic. The judges must have agreed with him because he received flight scores that placed him high in the final standings.

Mechanical options also need to be done in a scale-like fashion for maximum effectiveness. Here, scale buddy Roy Vaillancourt shows how a drop tank should be released. During the maneuver, Roy flies a little higher than normal and at a slightly farther distance from the judges. With a good separation, the tank drop is a sure thing for maximum mechanical option points.



K-FACTORS?

You should choose optional flight maneuvers with your individual aircraft's characteristics in mind. There are no K-factors involved in scoring maneuvers, so a 4-point roll or avalanche is scored on the same basis as straight and level flight. Putting it another way: my Extra 300 is quite capable of 4-point rolls, spins as well as many other aerobatic maneuvers, but it also does nice, straight flight maneuvers. If, during a contest, I do a 4-point roll and I lose my heading, or don't hold knife-edge long enough, or don't properly center the maneuver, my score will be downgraded. The aerobatic downgrade is more severe than a downgrade for a change of elevation during straight flight. Why take the chance?

I am not down on our current system, but I would like to see a K-factor instituted for certain maneuvers. For instance, why not give the 4-point roll or the 3-turn spin a 1.2 degree of difficulty handicap? This would certainly reward good flying and might even encourage flyers to do more aerobatics in competition. Keep in mind, I am referring to only a few more difficult maneuvers being eligible for this bonus. Do any of you have an opinion?

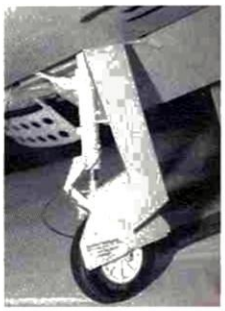
In summation, I recommend executing simple maneuvers that you can perform well. Do not do a loop or roll unless you (and your aircraft) are up to the task. If your airplane cannot perform equal to your skill, then get another plane that can. Never apologize for your airplane or your flying skills. If you have difficulty performing certain maneuvers, then build a pattern ship and go out and practice. Once you have mastered the basics, go on and work them out with your scale ship.

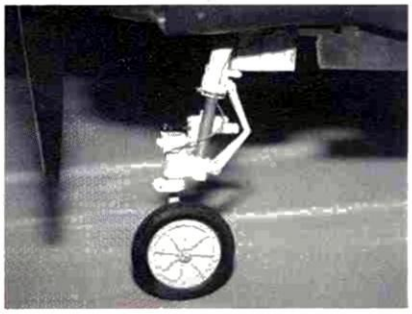
DAVE PLATT MODELS

At the recent Toledo show, I was very impressed on seeing Dave Platt's* new scratch-built North American T-28C Trojan. This 1/5.5 masterpiece is carefully crafted and beautifully weathered to true miniature dimensions. It was one of the most impressive scale models I have ever seen. Obviously, the scale judges at Toledo agreed with me, as Dave's plane won Best of Show.

Dave Platt Models is currently offering a semi-kit of the new T-28 along with retractable landing gear and a scale "dress up" kit. The dress up kit includes a dummy engine crankcase and nine cylinders, a 3-blade prop and prop hub, a Navy pilot figure and a cockpit interior detail kit. These are all finely crafted and machined parts and are guaranteed to give your T-28 the ultimate scale look without the all the hard work involved in scratch-building.

Dave Platt Models offers a video tape showing Dave's weathering techniques. The 100-minute "Black Art" tape shows how he weathered his award-winning T-28 Trojan.





Top: Dave Platt won Best in Show at the 1997 Toledo show with his masterful T-28 Trojan. The degree of detail and weathering is very impressive. Bottom: the landing gear supporting Dave's T-28; completely functional and scale. What else would you expect?

Dave also provided me with a copy of a video demonstrating his scale finishing and weathering techniques. It's called "Black Art," and you know it has to be good coming from Mr. Scale! The very same T-28C I saw in Toledo is the subject of the tape. In 100 minutes, Dave takes his clean and pristine T-28 and transforms it into a beautifully weathered masterpiece. Along the way, Dave offers anecdotes and ideas and shares his thoughts while actually showing you his techniques. I felt as though I were sitting in Dave's shop while he worked on the plane.

I heartily recommend "Black Art" to all scale modelers. You will enjoy watching it time and again.

BOX OF BOLTS

Greg Namey of Innovative Model Products* (IMP) has recently added Bolt glues to his line of offerings. Because there are so many glues on the market and they all work well, you might ask, "Why do we need another glue product?" My answer is: individual choice. Modelers often find they like a particular product and then stick with it. I have used the Bolt epoxy and CA glues on my Midwest AT-6 Texan, and I am satisfied with their results.

The "Box of Bolts" package is a 5x8-inch plastic box containing thick, medium and thin CA, accelerator and 5-minute epoxy, along with some mixing sticks. It sure is handy to have around, as it fits nicely in your field box. You never know when you'll need some glue at the flying field. Give IMP a call and pick up a Box of Bolts.

This "Box of Bolts" glue kit is just the thing to keep in your field box—just in case! It's available from Innovative Model Products.

Well, that is pretty much the "package" for this month. Enjoy your flying season.

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.* +

Effective PROGRAMMING

by DON EDBERG

PROGRAMMABLE MIXERS

SO FAR, WE'VE TALKED about the built-in, preprogrammed functions that can be found in computer radios. These are used to set up aerobatic, pattern, fun-fly, glider and helicopter models to do all sorts of things. But what if you have a model that doesn't easily fit into one of these categories? Or what if you want to correct the way a model flies to make it easier to handle? You can use programmable mixers for this purpose.

Have you ever driven a car that pulled to one side whenever you hit the brakes? If so, you know you had to turn the steering wheel against the pull as you hit the brakes. You didn't know it, but you were mixing from brakes to steering wheel!

Programmable mixers are among the most useful and versatile features of computer radios, and they may be used to make similar corrections to this sort of thing in models. They're also used to custom program special functions that are not contained in built-in menus.

Mixers may be used to mix between any two desired channels so they automatically apply corrective motions to make flying easier. As a Futaba* manual says, mixers "correct bad tendencies of the aircraft and make operation more pleasant." For example, a mixer could be used to automatically apply a bit of rudder when throttle is applied for takeoff to account for torque/P-factor effects, or to apply corrective elevator or aileron during knife-edge flight to correct for an undesired pitching or rolling tendency. Using mixers, you can make the ailerons or elevator move automatically when rudder is applied.

The table included with this column lists some potential problems and model configurations that you may use mixers to deal with. Obviously, the list is not complete, and you may add your own ideas and needs. Note that the more expensive systems have built-in functions that accomplish some of these mixes. Usually, the built-ins are better and easier than programming mixers from scratch, so use them if you have them available.

The table gives a list of potential problems or desired functions, and the model type that may have them. The last two columns, Master and Slave, refer to the channel that commands the mixing and the channel that receives the mixing input. Just because it's slaved, however, does not mean that the channel doesn't respond to its normal function. For example, when you set up a programmable mixer to give you Aileron —> Rudder mixing, the rudder moves when you move either the rudder stick or the aileron stick. In other words, the slave channel responds to both the master control and motion of its own control.

Computer radios can have anywhere from zero to five freely programmable mixing functions. The least expensive radios, such as the Airtronics* Radiant and JR* XF622, do not provide any mixers. The Futaba T6X provides two mixers, and the Airtronics Stylus and JR XP642 provide three. Futaba's 8U/FF8 and 9Z both provide five mixers; JR's XP8103 (3810 out of U.S.) provides six, and the 10SXII provides eight!

Multiplex* radios, recently introduced in the U.S., also provide mixing functions. Hitec* systems don't provide any free mixers (there are, of course, preprogrammed functions in the more expensive Hitecs). In general, the more you pay for a computer radio, the more mixers you get. The numbers of mixers given above are in addition to the preprogrammed functions that may also be found in these radios.

A simple mixer example will be provided for the benefit of those who have never used one. In a future column, we'll move on to some more complicated mixing setups.

In your modeling activities, you'll hear the terms mixing, compensation and coupling; all three terms mean essentially the same thing: inputs from one control affect the outputs of another (or several).

Sometimes, you'll run into terminology for mixers such as "unidirectional" or "bi-directional." Unidirectional means that there is a master/slave relationship, in which moving the master control causes motion of the slave servo, but not the other way around. Airtronics calls this a "compensation" mixer.

For so-called "bi-directional" mixers, the manual for the Airtronics Stylus states: "Bi-directional means that two channels are mixed so that inputs to either channel cause servo movements for both channels." These are commonly used for combined-function control surfaces, such as V-tail, flaperons, or elevons on a flying wing. A bi-directional mixer is really just two unidirectional mixers attached to each other ... and is usually a pre-programmed function, which we've discussed in previous columns.

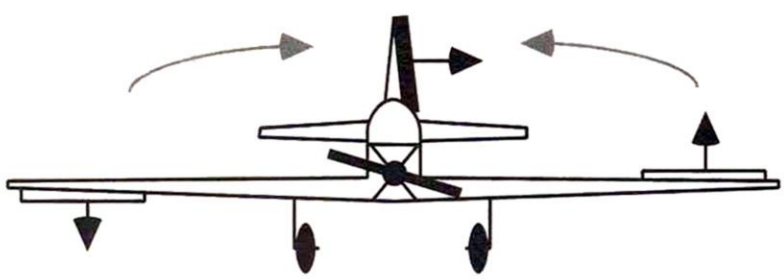


Figure 1. Aileron to Rudder mixing is used on some models to provide scale-like "coordinated" turns.

AILERON —> RUDDER COUPLING

Aileron —> Rudder coupling is a mixing function that causes the rudder to move whenever the aileron stick is moved. The programmable mixer

feeds aileron to the rudder automatically, as shown in Figure 1. To understand the idea of master and slave channels for this type of mixing, please refer to Figure 2. With a programmable mixer, you can always command rudder the usual way, with the rudder stick.

Using the rudder to make the fuselage point straight into the oncoming air stream is called "coordinating the turn." Aileron —> Rudder mixing helps provide turn coordination, avoid accidental spins with scale aircraft and reduces drag for sailplanes. The slower the model is flying, the more rudder coupling is needed; the faster it flies, the less rudder coupling is needed (during high-speed flight, no coupling is needed). The amount of rudder coupling needed for smooth, coordinated turns is highly dependent on the model configuration. Usually only a small amount of rudder is needed, especially if any aileron differential is present. Faster-flying models should not have any rudder coupling. As a "Philosophical Aside," please read the sidebar on using a mixer versus moving the rudder manually!

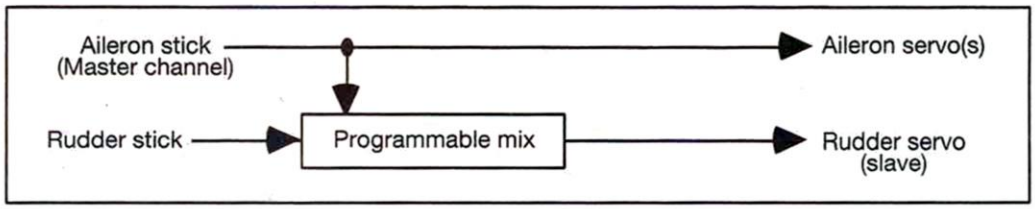


Figure 2. For Aileron —> Rudder mixing, the programmable mixer feeds aileron to the rudder automatically. You can also command rudder the usual way, with the rudder stick.

SETTING UP AILERON —> RUDDER COUPLING

(Assuming your radio has freely programmable mixers.)

1. Press whichever keys are needed to get to a programmable mixer menu screen.
2. Press the key or keys needed to activate, or turn on, the mixer.
3. Select the master control (the motion of which will cause the slave servo to move). Since we want the aileron stick to command rudder motion, select the master to be Aileron.
4. Select the slave channel (the servo that will respond to the master control). We want rudder to move with aileron stick, so select the one that Rudder is plugged into to be the slave channel.
5. Now you'll define the amount of mixing, an idea illustrated in Figure 3. The bottom of the figure shows aileron stick motion, and the side shows how much the rudder will respond. Note that zero mixing corresponds to a horizontal line and adding mixing slants the line more and more.

Although you've turned the mixer on, the default is usually zero mixing, so you won't get any rudder response until you program a mixing amount that is different from zero. Decent radios provide mixing functions that allow you to program the response on each side of the master channel (so you can select how much response you get to right aileron stick and left aileron stick separately). The side you're programming is usually indicated by a flashing number or a direction designator, and you usually select the direction (right or left) by holding the stick to that side. Now input a mixing percentage using the appropriate keys. Input a moderate amount of mixing; say, +20 percent. Move the aileron stick to the other side and input the same percentage.

6. If the rudder moves to the same direction as the aileron stick (when looking from the rear of the model), you

POTENTIAL APPLICATIONS FOR PROGRAMMABLE MIXERS

PROBLEM DESCRIPTION OR DESIRED FUNCTION	MODEL TYPE	MASTER	SLAVE
Model pitches when flaps or spoilers are applied	Power, sailplane	Flap/spoiler	Elevator
Model yaws with aileron input (adverse yaw)	Scale, sailplane	Ailerons	Rudder
Model pitches with power change	Any power model	Throttle	Elevator
Model lacks aileron roll response (models with dual flaps)	Sailplane	Aileron	Flaps
Model changes trim when landing gear retracted or extended	Model with retracts	Gear	Elevator
Model with V-tail	Sailplane, power	Elevator/rudder	V-tail 1, V-tail 2
V-tail rudder commands cause pitch change (wanted: V-tail with differential)	Sailplane (non-aileron), power	Elevator/rudder	V-tail 1, V-tail
Drag function with dual rudder servos	Model with twin rudders	Auxiliary	Rudders
Dual elevator servos (elevator only on both)	Power (2 elevators)	Elevator	2nd elevator
Dual elevator servos function differentially (ailevator function)	Any fixed-wing with two elevators	Aileron	2 elevators
Ailevator function switchable by pilot to elevator only	Any fixed-wing	Aileron	2 elevators
Smoke on *only* with smoke switch *and* high throttle	Power	Throttle on	Smoke
Pitch change during knife-edge with rudder applied	Power	Rudder	Elevator
Roll change during knife-edge with rudder applied	Power	Rudder	Ailerons
Full-span camber change	Sailplane	Flap stick	Ailerons/flaps
Twin-engine model needs two throttle servos	Twins	Throttle	Any available
Differential throttles for twin-engine models (one +, one –)	Twins	Rudder	2 throttles
Pitch change with collective	Helicopter	Collective	Elevator
Yaw change with collective	Helicopter	Collective	Rudder
Head speed drops during tumbles	Helicopter	Aileron and elevator	Throttle
Gyro gain setting	Helicopter	Gain switch	Gyro

have selected the proper direction for the mixing. Otherwise, change the sign of the mixing (change the sign in front from plus to minus or minus to plus). Note: do *not* use the reversing function to reverse the rudder servo to get the mixing in the correct direction. If you do, the servo's response to rudder stick will be reversed!

7. If you changed signs in Step 6, be sure to do it for both sides; otherwise, your rudder will go to the same side for either aileron command! You may need a slightly different amount of mixing if your linkage is not symmetrical.

8. Some radios allow the master's trim control to also drive the slave servo. In the case of rudder coupling, you probably don't want this to happen, since you can trim with the rudder trim separately.

9. On many radios, you can define a mixer on/off switch, which may be used to turn the mixer on or off during flight. You need to decide whether you want to have the rudder mix always on, or to have mixing turned on and off with a switch. Consult your manual to see how to select whether the mixer is switchable or always operating.

10. With the on/off switch definition, you may be able to select which switch turns the mixer on and off (on some radios, there's no choice). For example, you could have mixing turned on with the gear down, using the retract switch.

11. Check to make sure that your mixer operating switch works by holding some aileron stick and flipping the mixing switch on and off. When you flip the switch to the "on" position, the rudder should move to the side; when you select the "off" position, the rudder should return to neutral.

12. Now you're ready to make some test flights to fine-tune the mix amounts. With the model flying level in a straight line, gently rock the aileron stick back and forth. If the model's fuselage points straight ahead, you don't need to do a thing. If it seems to "waddle" back and forth in sync with the aileron stick, then you have some adverse yaw, and it will help to increase the amount of rudder mixing.

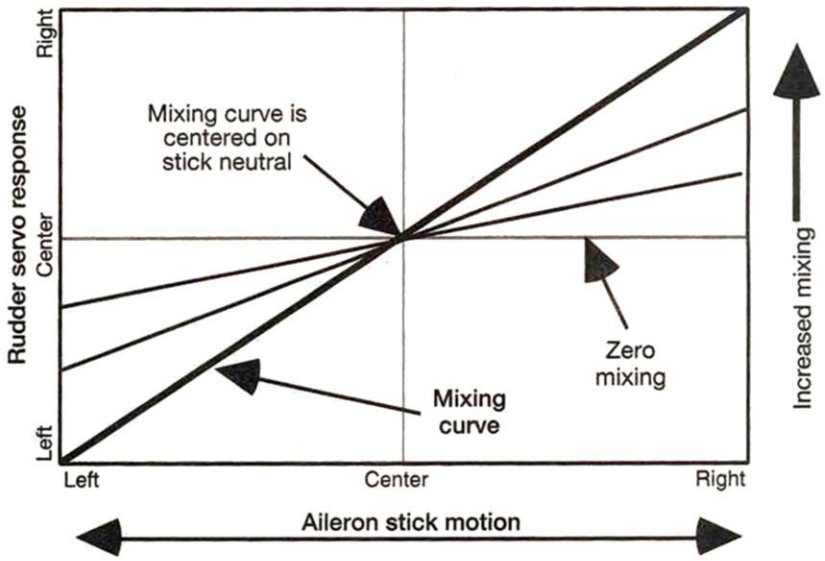


Figure 3. The Aileron —> Rudder mixer responds as shown by the Mixing Curve, the heavy line in the figure. When the aileron stick is moved left or right, the rudder servo responds in the same direction. Increased mixing provides larger rudder servo response to aileron stick. Usually, 100-percent mixing moves the slave servo 45° with full master-control travel.

PHILOSOPHICAL ASIDE

In the long run, it is better for you not to use rudder coupling but instead to learn to use your left thumb (Mode 2 transmitter assumed) to manually apply the rudder. This takes considerable practice (of course, helicopter pilots already do this without thinking!) but is more beneficial, especially with a fixed-wing model that has a wide speed range. This is because the amount of coupling or differential is dependent on the model's flight speed; a slow-moving model requires some during takeoff and landing, but a very fast model (high-power cruise) needs almost none.

Another bonus of learning to use rudder independently is that you can learn to sideslip during landings to intentionally create more drag and a steeper descent, or make a smooth landing approach in a crosswind. To do a sideslip, you feed in a fair amount of rudder (either side is OK). Next, apply a bit of opposite aileron to bank the wing slightly away from the rudder to fly in a straight track, with the fuselage at an angle to the flight direction. You can still move the ailerons for directional control, but now the fuselage is not streamlined into the wind; this produces more drag and steepens the approach. This makes landings easier, especially if you don't have a good low-speed idle, spoilers, dive brakes, or butterfly/crow function.

READER Q&A

I received the following email comments on the April '98 programming column: "... regarding flaperons, most pattern models with full span surfaces do not respond as expected to the flap function." [The common belief is that when flap is commanded, the nose will pitch up.] "In fact, the effect can be reversed, where commanding down flaps results in nose-down pitch ... I have personally experienced it, to my surprise."

Of course this is true, and I also have experienced it with sailplanes whose wings are moderately swept. The cure is to use a mixer, and program flap —> elevator compensation so the pitch change is minimized. If you're using a built-in airbrake or butterfly/crow function, it includes a built-in elevator compensation function.

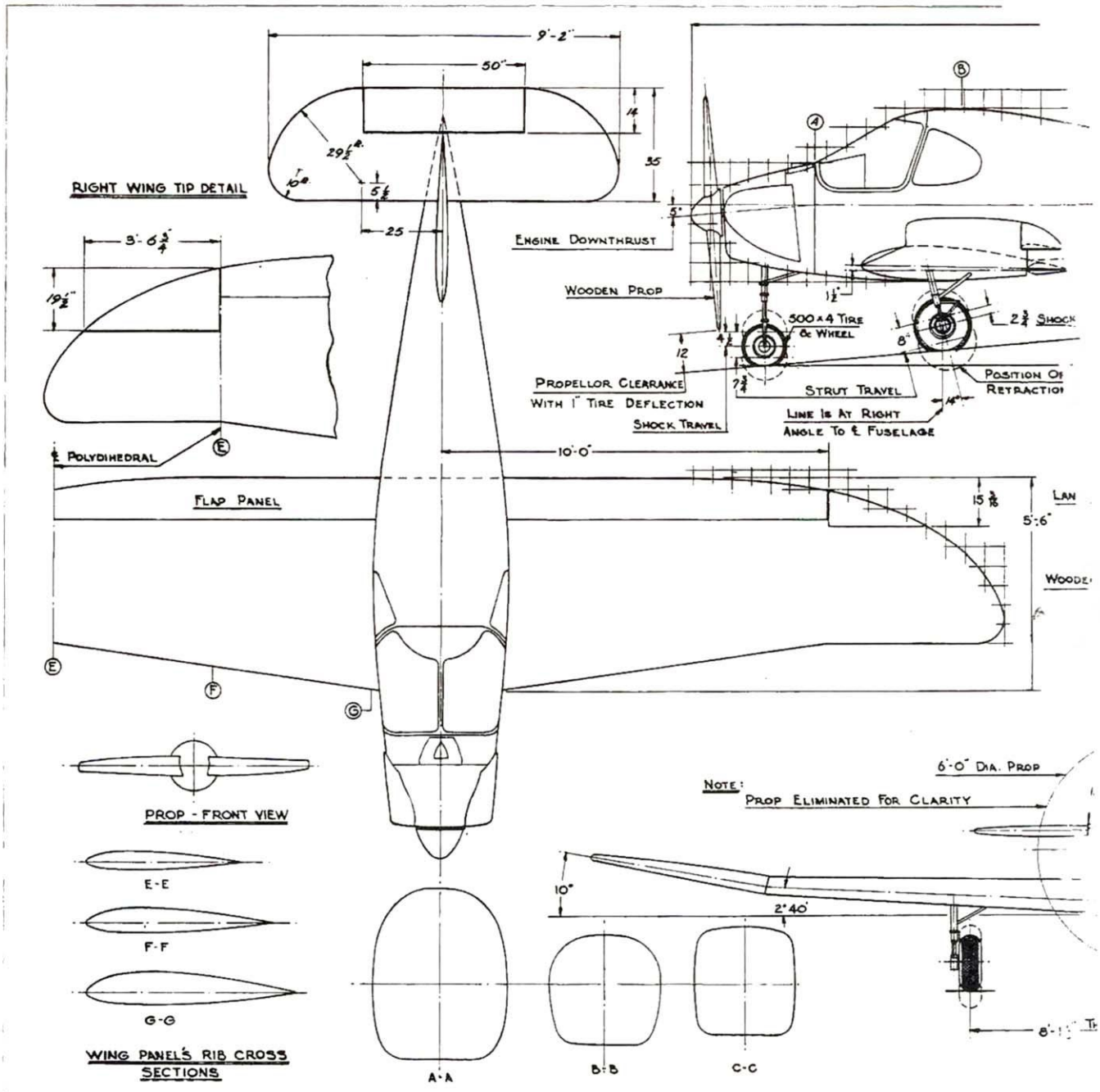
Remember, if you want to write me personally, send your self-addressed, stamped envelope to Don Edberg, 4922-N Rochelle Ave., Irvine, CA 92604, or you can email me at <dynamic3@flash.net>. I get lots of mail, so please be patient!

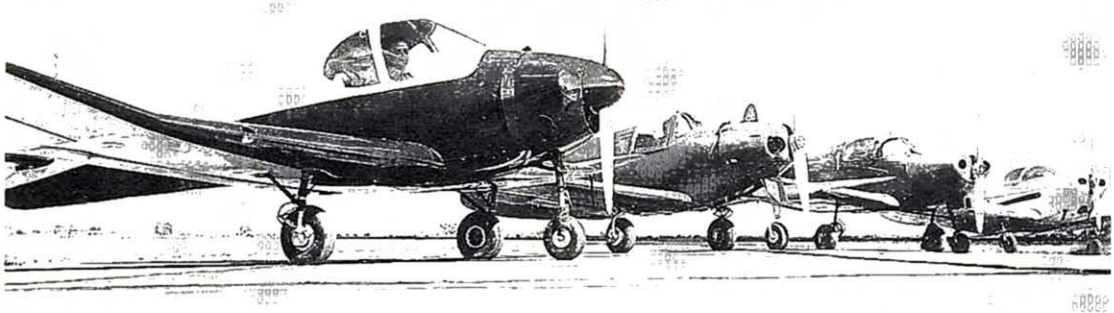
**Addresses are listed alphabetically in the Index of Manufacturers on page 126.*

Planes Worth Modeling

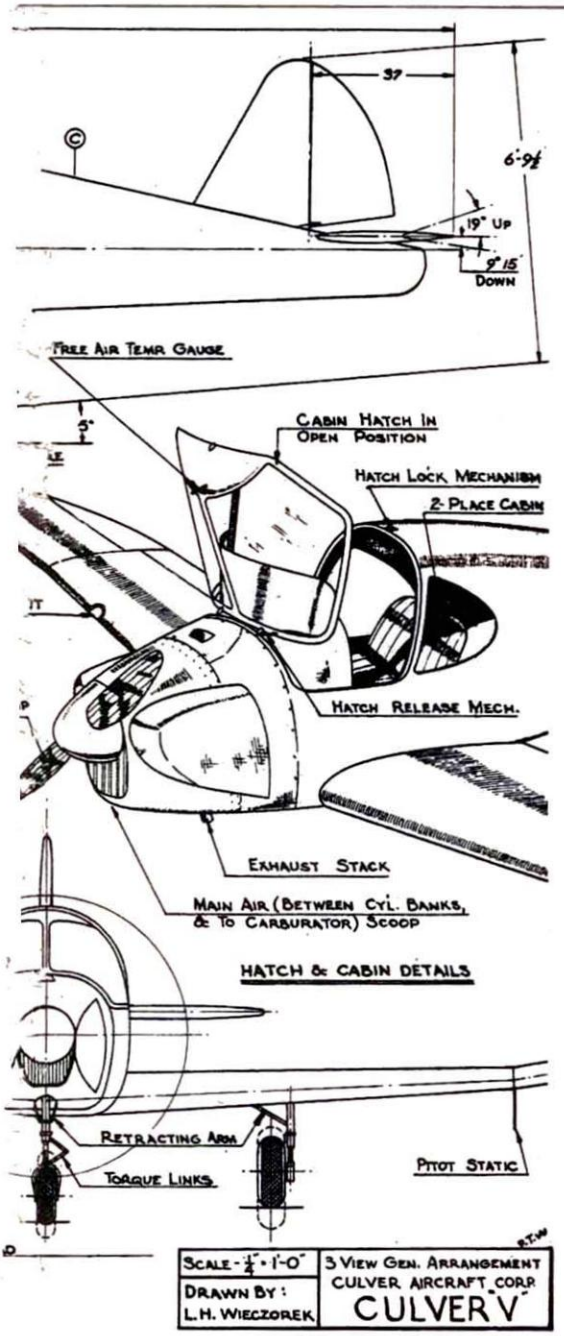
3-View Documentation for Scale Modelers

Culver Model V

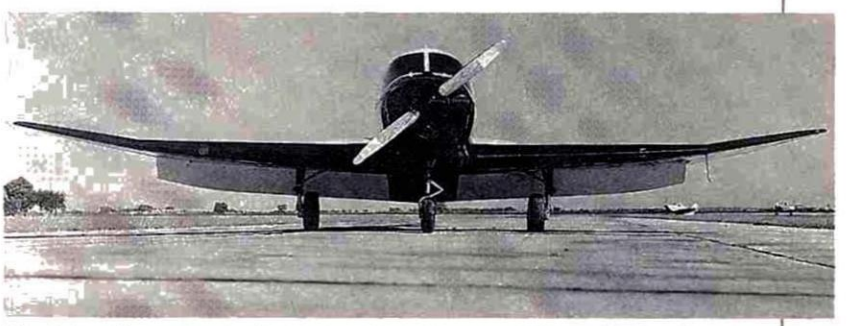




Four generations of Culver aircraft (left to right): the Model V was the last design the company produced; the Navy version of the PQ-14 and Culver's last R/C target plane, the TD2C-1; the TDC-2 (the Navy version of the Army PQ-8A), Culver's second R/C target plane; and the prewar commercial Culver, with which the company made its bid to build the Army's first R/C target aircraft in 1940.



When it was introduced in 1946, the Culver V was the fastest lightplane in the world for its horsepower.



The Culver V's upturned wingtips contributed to its stability and ease of flying, and its large flap was partly responsible for its being "unspinnable."

SPECIFICATIONS

Wingspan: 29 ft.

Length: 20 ft., 6 in.

Height (rudder): 6 ft., 9.5 in.

Stabilizer span: 9 ft., 2 in.

Wing dihedral: 2°-40'; 10° (tip)

Wing area, including flaps: 125.9 sq. ft.

Gas capacity: 35 lb.

Cruising range: more than 720 miles at 130mph

Powerplant: Continental 85hp fuel-injection engine

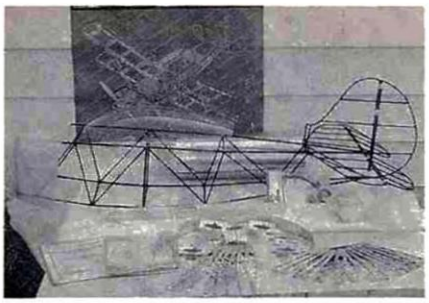
Billed in 1946 as the "greatest improvement in aviation in the last decade," the Culver Aircraft Corp. two-seat Model V was the first land plane introduced in the U.S. after WW II, and its design integrated all the lessons of the War into a fast, stable, civilian lightplane that was years ahead of its time. The Model V's most unique feature was the new Mooney Simpli-Fly control, which had been developed to prove to the American public that flying was a practical mode of transportation and could be safely enjoyed by everyone. The Mooney control system reduced the chance of pilot error by connecting the wing flaps and stabilizer and integrating them with a flight-control dial that indicated optimum settings for takeoff, climb and cruise; in other words, the plane trimmed itself for almost automatic, foolproof flight. (Essentially a dual-control airplane, rudder was used only for crosswind takeoffs and landings.) If that weren't enough, the Model V featured built-in anti-stall and anti-spin characteristics and a forward center of gravity that barely shifted when the plane was loaded.

Other features included: electrically retractable tricycle landing gear with auxiliary manual control; a controllable-pitch propeller; an 85hp Continental engine with fuel injection to eliminate carburetor icing; and individually adjustable air-foam seats.

The sixth design in a series, the Model V owed much of its refinements to its predecessors, including the legendary Army and Navy R/C drone target planes Culver was the sole supplier of during WW II.

—Debra Sharp

LATEST PRODUCT RELEASES



VERTICAL PERFORMANCE UNLIMITED

38% Christen Eagle II

The basic structure of this kit is made out of welded 4130 steel tube and is based on the full-size aircraft's drawings. The aluminum panels, landing gear and engine mount are also welded. The wings are built up with internal bracing wires, just like the full-size airplane. Similar kits include a 1/3-scale Pitts, an S-2 and a WACO YMF Super. Send $10 to Vertical Performance Unlimited for a catalog.

Vertical Performance Unlimited, 101 N. Town Rd., #13, Kirksville, MO 63501; (660) 627-1614.

PAT'S CUSTOM MODELS

Cessna Skyhawk Plans

These rolled plans for a schoolyard-scale Skyhawk were designed for the Mini-Olympus gear drive and 6V Speed 400 motor. When equipped with a 600AE 7-cell battery, the model will fly for more than 12 minutes. Specifications: wingspan—50.5 inches; wing area—328 square inches; length—37 inches; weight—18.2 ounces (7 cells), 17.5 ounces (6 cells). For more information on this and other plans, send an SASE to Pat's Custom Models.

Price—$12.95 (plus $5 S&H).

Pat's Custom Models, 10313 Snowheights Blvd. NE, Albuquerque, NM 87112-3054; (505) 296-4511; website: www.thuntek.net/pcmodels.

INFORM YOUR CUSTOMERS!!

Model Airplane News is interested in showing our readers your new products—here in Product News. If you'd like to see your products here, send us a clear photo and a press release that provides information about your product! We'll publish as many as space permits.

Send your announcements to: Product News, Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606.

SKS VIDEO PRODUCTIONS

Florida Jets '98

This 90-minute coverage of the second annual Florida Jets features Andreas Gietz's new turbine trainer, the Kangaroo; Baron Guss's 747; Derrick McEwan's F-106, Century Jet Models' new F-104 and MiG 15; and jet world champion Wolfgang Klohr's F-86. The first public demonstration of the new AMT Mercury turbine is also included.

Price—$24.95 (plus $3 S&H).

SKS Video Productions, RD #1, Box 264, Pine Rd., Abbottstown, PA 17301; (800) 988-6488; (717) 259-7193; fax (717) 259-6379; email: sksvideo@cyberia.com; website: www.yorkpa.com/sks.

KYOSHO

Ferias EP ARF

This all-wood electric ARF requires no sanding or painting and very little gluing, and it comes covered in transparent red film with white trim. It can be flight-ready in just two hours, and its 380-class motor with gear-reduction unit comes installed. Specifications: wingspan—39.7 inches; wing area—295 square inches; weight—1.5 pounds; radio required—2-channel with auto cutoff, or 3-channel with a speed control.

Part no.—KYOA1205;

price—$139.99.

Kyosho; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826; (217) 398-6300; fax (217) 398-0008; website: www.kyosho.com.

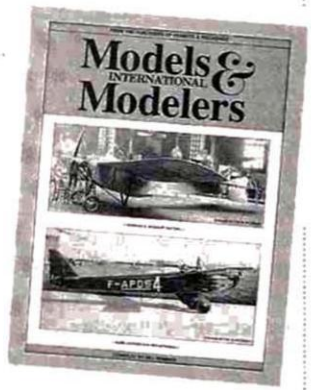
HANNAN'S RUNWAY

Models and Modelers

Hannan's Runway has released yet another addition to its growing line of books. These little gems are just the thing for a rainy day or when you just want to kick back and relax a bit. "Models and Modelers" is the first in this new series; it features the great photos and plans we've come to expect from Hannan's other book series. Farman lovers will particularly like this volume, though there are also plans for a Nieuport Swallowtail and a 1913 Aviette.

Price–$9.95.

Hannan's Runway, P.O. Box 210, Magalia, CA 95954; (530) 873-6421; website: runway@prodigy.com.



Product NEWS

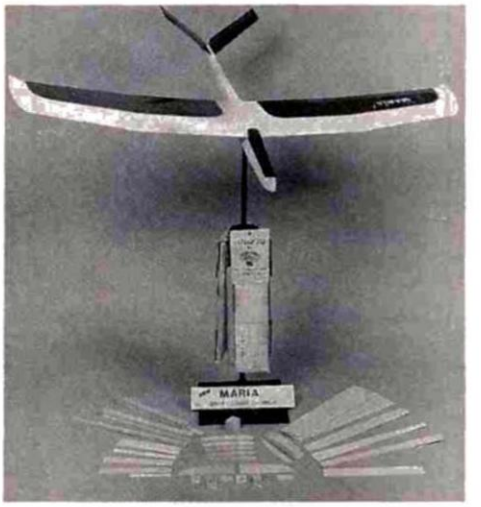
SQUADRON PUBLICATIONS

Detail & Scale F4U Corsair

Bert Kinzey presents a complete photographic treatise on the F4U Corsair. Bert knows what modelers want, and he provides detailed photos of virtually every nook and cranny of this popular warbird. It's a must-have for anyone interested in building an accurate "hose nose."

Price–$17.95.

Squadron Publications, 1115 Crowley Dr., Carrolton, TX 75011.



BUZZ WALTZ R/C DESIGNS

Maria

This V-tail sport hand-launch model can be flown on the slope, hand-launched and fitted with a Speed 400 motor or a ½A engine. It has a 58-inch wingspan with a wing area of 466 square inches. The kit features precision-cut balsa and ply parts, spruce wing spars, easy-to-follow instructions and a full-size plan sheet.

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1/9-scale Grumman F6F Hellcat

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Part no.—HM-2-1; **price**—$140.

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Name THAT PLANE

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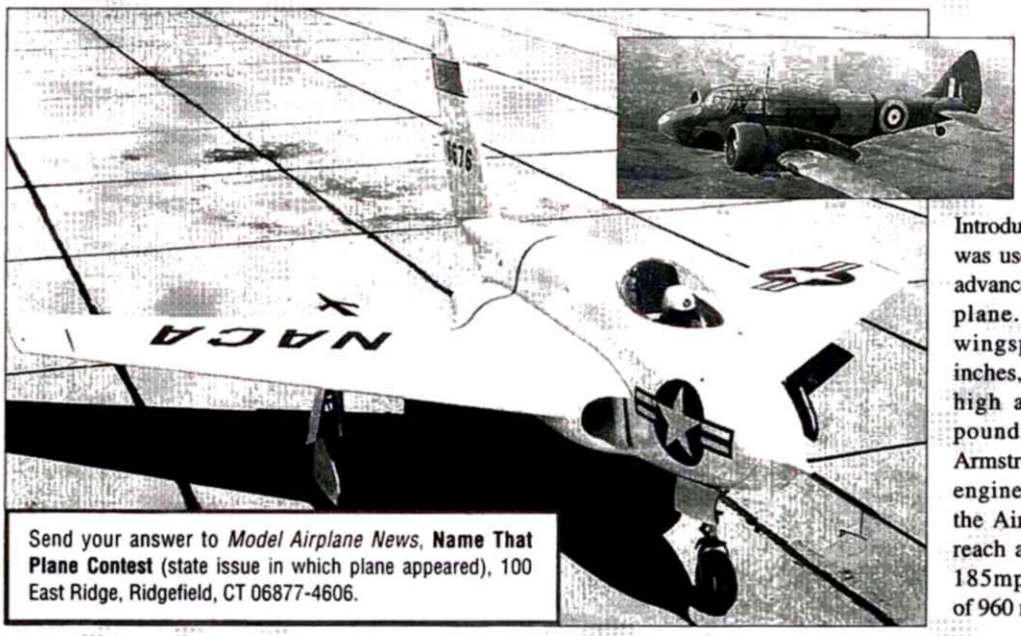

Send your answer to *Model Airplane News*, **Name That Plane Contest** (state issue in which plane appeared), 100 East Ridge, Ridgefield, CT 06877-4606.

Congratulations to Alan Freeman of Rochester, NY, who correctly identified the July '98 mystery plane: the Airspeed Oxford. Introduced in 1937, the craft was used for 17 years as an advanced trainer and liaison plane. The plane had a wingspan of 53 feet, 4 inches, was 11 feet, 1 inch high and weighed 7,600 pounds. Powered by two Armstrong-Siddely Cheetah engines with 350hp each, the Airspeed Oxford could reach a maximum speed of 185mph and had a range of 960 miles.

The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail) and will receive a free one-year subscription to *Model Airplane News*. If already a subscriber, the winner will receive a free one-year extension of his subscription.

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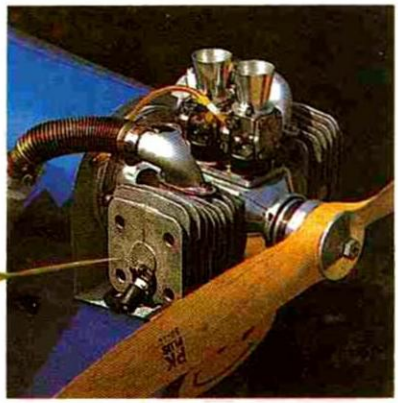
TO BE A SUPER BEE

In the air, the Super Bee performs just like its smaller relatives; it just uses a whole lot more air space!



Power for the Super Bee is provided by an Air Hobbies 9.8ci twin-cylinder engine turning a 30x10 prop. The twin tuned-pipe exhaust is homemade.

How's this for a big Lazy Bee! Built by Mark Davidson of Greenville, SC, this "Super Bee" is the result of way too much beer and pizza at the workshop. Actually, it is an enlargement (x 4) of the Clancy Aviation standard-wing model, and it has a 17-foot wingspan. This translates to a 56-inch-wide chord and an all-up weight of 80 pounds! The model is 126 inches long, and power comes from an Air Hobbies 9.8ci twin-cylinder engine.

The Super Bee owes at least some of its lineage to Kirby McKinney, also of Greenville. Kirby, the general assistant-at-large of the Joe Nall Giant-Scale Fly In, puts on an annual Lazy Bee-only "Swarm In" on the first weekend of January. This event, according to many of Kirby's friends, is the most fun you can have without getting arrested. Anyway, after much thought (not to mention all that beer and pizza), Kirby simply said one day, "Wouldn't it be nice to have a really big Lazy Bee?," and the rest is history.

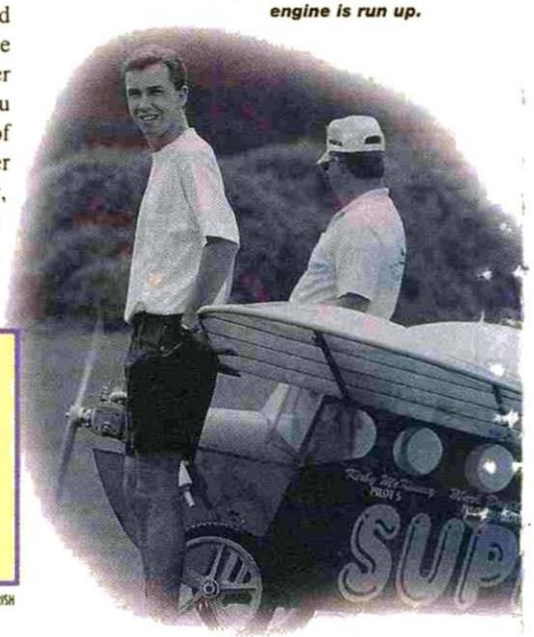
Construction is surprisingly very model-like and consists of plywood, balsa and a lot of spruce. To secure the one-piece wing to the fuselage, attachment bolts run through the main spar and are secured with heavy-duty vertical aluminum wing-mount brackets attached to the inner sides of the fuselage. The horizontal stab and elevator span 7 feet, while the semi-round rudder has a diameter of about 3 feet. Would you believe that seven, 25-foot rolls of MonoKote were needed to cover this monster? The landing gear, in keeping with the Lazy Bee tradition, is mounted in a slot in the bottom of the fuselage, and bungee cords supply the shock-absorbing element. The wheels come from a push lawn mower.

Elevator control is provided by a Seiko 1,000 oz.-in. torque, industrial-grade servo. Look closely; you'll see there are two carbon-fiber pushrods leading from the servo to the single control horn.

The Super Bee is flown just as its small cousins are, with only three channels: rudder, elevator and throttle. Seiko industrial-grade servos produce 1,000 oz.-in. of torque and make flying the Super Bee a cinch. And when it comes to flying, the Super Bee is just as nimble as a small Bee. Loops and spins are very tight, and rolls look pretty fast as well. Because of the aircraft's enormous proportions, Mark has wisely decided not to really throw it around—just in case. Only at Joe Nall are such wonders of R/C possible. How will they top this one?

—Gerry Yarrish

Two trusting souls help hold back the Super Bee while the engine is run up.



SPECIFICATIONS

Type: Crazy Giant R/C
Name: Super Bee
Scale: 4-times-enlarged Clancy Aviation Standard Lazy Bee
Span: 17 ft.
Chord: 53 in.
Wing area: approximately 10,812 sq. in. (75.083 sq. ft.)
Weight: 80 lb.
Wing loading: 17.04 oz./sq. ft.
Length: 10 ft., 6 in.
Radio: 3-channel (rudder, elevator and throttle)
Powerplant: 9.8ci Air Hobbies twin-cylinder gasoline engine

PHOTOS BY GERRY YARRISH